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VOLUME XIII JUNE 30, 1924 NUMBER 11

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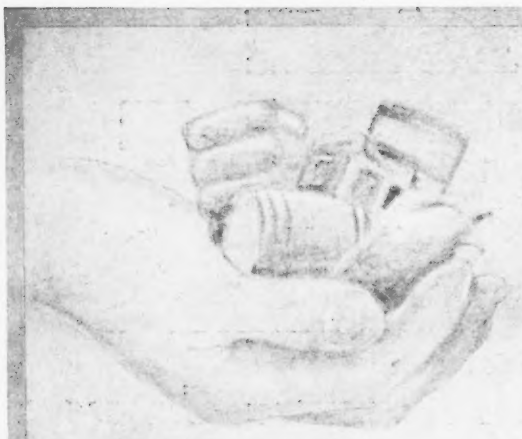

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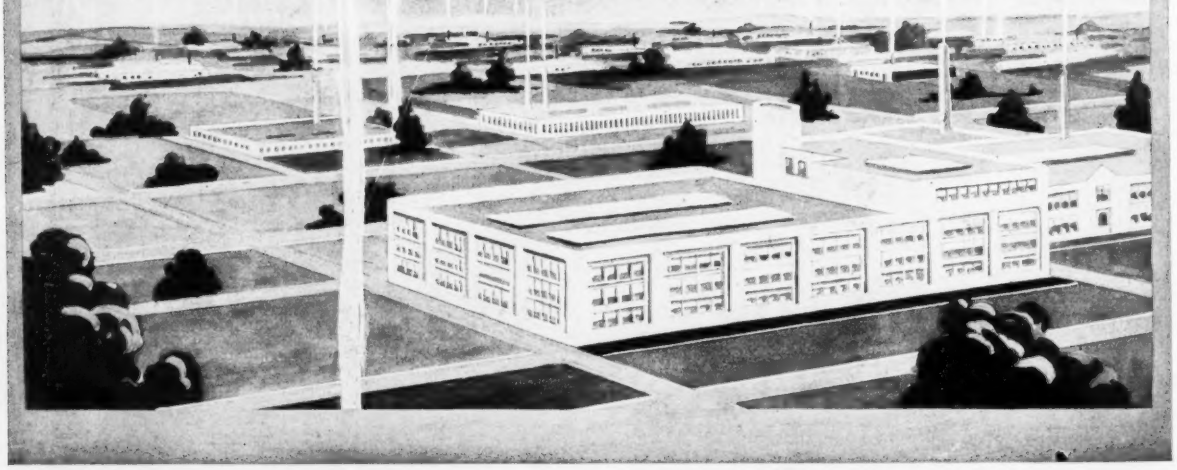

American Dyestuff Reporter, Vol. XIII, No. 11. June 30, 1924. Published twenty-two times a year by Howes Publishing Co., Inc., 90 William Street, New York, N. Y. Domestic subscription $5.00; Canadian, $5.50; foreign, $6.00. Entered as second-class matter Nov. 6, 1919, at the New York, N. Y., Post Office, under the Act of March 3, 1879. Copyrighted, 1924, by Howes Publishing Co.

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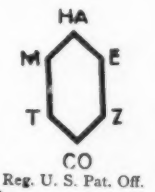

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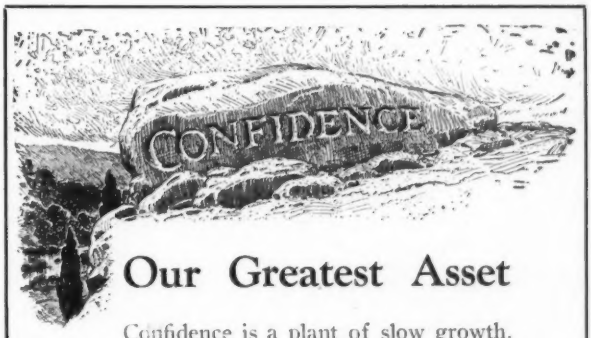

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VOLUME XIII | NEW YORK, JUNE 30, 1924 | NUMBER 11

Acid in Cotton Goods

Amounts of Acid That Are Found Dangerous—Various Test Methods—Recent Refinements in Tests—Preparing Neutral Cloth

By CHARLES F. GOLDTHWAIT

THE amount of acid remaining in cotton goods from some previous processing is not only of interest but often of extreme importance. Most of us have more or less crude methods of arriving at an estimate, but recently more accurate methods of analysis and more definite determinations of the amounts of mineral acids that will cause damage have been published. They are of special interest where the amounts are very small and ordinary methods are not reliable.

This brief review will consider only the effects of drying mineral acids into cotton goods which are bleached and free from finishing materials, unless otherwise noted, for usually the undesirable acid effects appear only on drying.

Coward, Wood and Barrett have performed very interesting experiments on neutral cotton cloth, which was wet with its own weight of hydrochloric acid of several definite concentrations. The per cent strength was therefore also the per cent of acid referred to the weight of cloth. The fabrics containing acid were dried between copper plates for 10 minutes, and were then immersed in water, washed and hung up to dry and condition for strength tests.

Their conclusion was that 0.01 per cent of hydrochloric acid will cause appreciable tendering at 120 deg. Cent., and that 0.05 per cent will produce bad tendering even at 100 deg. Cent. (J. T. I., 14, T527). The two figures show other details of the tests as well as the complete results. (Figs. 1 and 2.)

It seems reasonable to assume that the volatile hydrochloric acid would not be as destructive if dried without being so closely confined. No doubt sulphuric acid of equivalent concentration would produce as bad a result under the same enclosed conditions and probably, since it is not volatile, about the same in the open.

The conclusions quoted confirm in a general way Lester's statement (J. S. C. I., 34, 934) that the limit of acid allowance in cotton cloth is 0.01 per cent of its weight of free hydrochloric, and another remark of unknown source that "As little as 0.002 per cent of acid in cotton cloth is dangerous, and even 0.01 per cent will cause tendering if pressed with a very hot iron," referring particularly to sulphuric acid such as might develop in sulphur dyed goods.

Qualitative tests for ordinary amounts of acids can be made with the ordinary indicators, and for smaller amounts by pressing indicator papers between folds of the dampened goods.

Quantitative tests have been made in different ways. Titrating aqueous extracts is not satisfactory, for it is well known that cold water may extract acid until the extract becomes neutral but still leave acid in the cotton. Repeated extraction with warm water is better, but boiling twice with water was found under some conditions and up to about 0.1 per cent acid on the goods, to actually leave more in the cloth than it extracted; and this region of doubt is just where tendering is likely to become noticeable.

Titration in the presence of the goods has also been recommended, and forms the basis of the improved method, in which certain precautions are quite important. For example, a solution slightly alkaline to phenol phthalein may be decolorized by the carbon dioxide introduced with a cloth sample.

The procedure in detail is: Boil 100 c.c. of distilled water in an Erlenmeyer flask of "resistance" glass with 1 c.c. of 0.5 per cent alcoholic phenol phthalein and titrate with N/50 sodium hydroxide to a faint pink that will remain permanent for 10 minutes with the flask loosely stoppered. Then add three grams of the goods being tested and boil a few minutes, finally titrate to the same end-point, permanent for 10 minutes in a closed flask. (Coward and Wigley, J. T. I., 13, 123.)

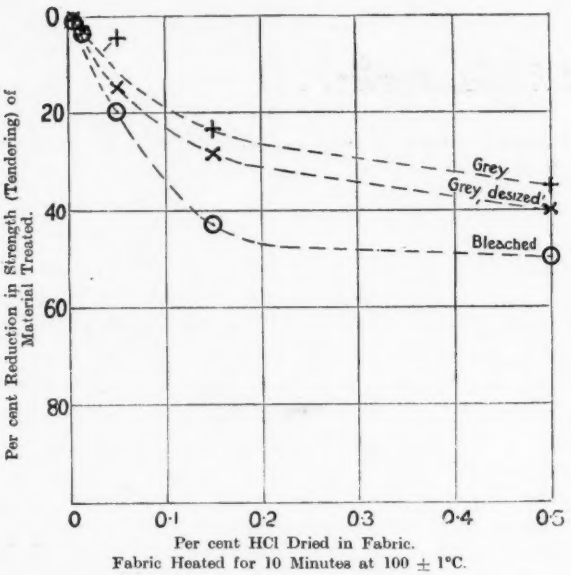
A neutral sample will consume about 0.1 c.c. of the alkali.

If the indicator shows the sample to be already alkaline, add a measured excess of N/50 sulphuric acid, boil 10 minutes and titrate with sodium hydroxide as before.

The titration for acid is accurate to 0.01 per cent acid on the weight of the goods, and for alkali to 0.02 per cent.

In the last paper quoted, qualitative tests are also described which will answer most purposes. Their sensitiveness was determined by tests on neutral fabrics which had had definite amounts of acids or alkalies dried into them at room temperature. The most interesting results are given in full:

"Methyl Red.—A saturated solution in water made a



bright red color when dropped on to cloth containing 0.005 per cent acid, and a yellow color with 0.005 per cent alkali in cloth. The indicator is good for ascertaining whether a cloth is well washed commercially.

"Methyl Orange.—A 0.01 per cent solution in water gave indications of acidity only when the proportion of acid exceeded about 0.1 per cent sulphuric acid. The pure red color is reached at about 0.16 per cent sulphuric acid.

"Phenol Phthalein.—A 0.5 per cent solution in 60 per cent alcohol gives no visible coloration on fabrics containing sodium carbonate until the amount of the latter reaches the equivalent of about 0.2 per cent sodium hydroxide of the weight of the fabric. The color produced by this amount of the alkali is quite faint in the circumstances of a 'spot' test.

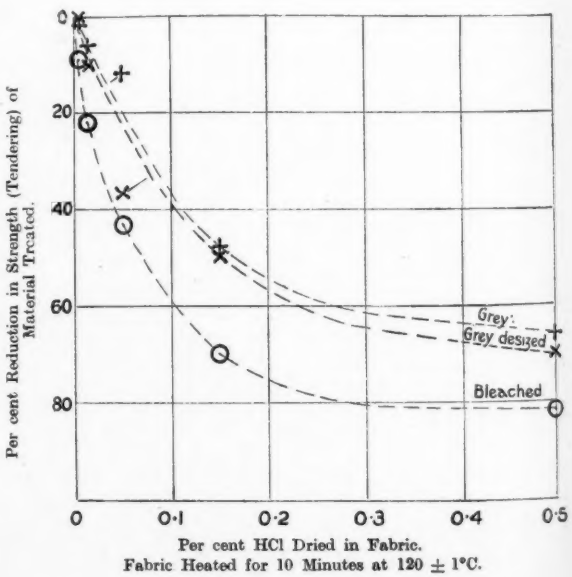
"Litmus.—The well-known objections to litmus solution are magnified in connection with the testing of cloth. Its color is not strong, and the color change is not sharp. Litmus paper is, however, considerably more sensitive when pressed between layers of a moistened fabric for a few minutes, or when moistened test paper is pressed against the suspected fabric. A slight color change is observed with 0.01 per cent of acid or alkali."

Tests made on fabrics dipped into solutions of known strengths are not so satisfactory. First, the strength varies during drying and is indefinite, and second, when cotton is dipped into either acid or alkali it takes up a certain amount of the solution, but an extra amount of the dissolved material, apparently by true adsorption. Positive figures cannot be given, but for solutions of sulphuric acid of N/50 and lower, the adsorption is of the order 0.03 per cent to 0.05 per cent, enough to cause tendering under some conditions, and enough to introduce uncertainty into an analysis if not properly taken into account. (J. T. I., 14, 531.)

Methods of Preparing Neutral Cotton for Test

To remove such influences in their work Coward and Wigley prepared neutral cotton. Since a fiber of known characteristics is so important in research work the method is briefly outlined. Well bleached cotton free from oxycellulose was treated with dilute caustic soda, and a second lot with dilute hydrochloric acid until definitely acid and alkaline respectively. Then both were washed repeatedly with boiling distilled water. The two fabrics approached the same condition on washing, and on spotting with indicators Methyl Red was finally the only one to show any difference. Then by treating the alkaline fabric with 0.005 per cent of its weight of acid and the acid fabric with 0.005 per cent alkali, the reactions were so nearly reversed that the samples were within that per cent of neutral, close enough for all practical purposes. Cloth prepared by any simpler method of neutralizing or washing can be controlled by the Methyl Red test.

Note.—If contemplating work where any of these methods are applicable, one should go carefully over the original article by Coward and Wigley, as it contains other valuable suggestions. There is also information of practical interest in Kind, Das Bleichen der Pflanzenfasern, 1922, and Heermann, Faerberei—und textilchemische Untersuchungen, 1923.



Dyeing and Finishing Cotton Piece Goods*

Malting of Gray Goods—Jigger Dyeing—Continuous Dyeing Machine—Padding of Cotton Piece Goods—Preparation of Sizing Mixture—Sizing

By HERBERT S. TRAVIS

THE dyeing of cotton fabrics involves both chemical and mechanical difficulties. In the dyeing of heavy shades and black the greatest obstacle is in the securing of perfect penetration of the cloth. If the cloth is not dyed thoroughly the goods possess little value for certain purposes. The first consideration in dyeing cotton fabrics is to give the gray cloth proper preparation in order that whatever dyeing process may be adopted, the dye will have a clear bottom upon which to work. The clearer and cleaner the fabric, the brighter and fuller the shade desired will be. A cheap-class fabric will not always permit perfect preparation, and consequently flat and possibly uneven shades will result. Where a finer grade of goods is to be dyed, even shades with good penetration, it is advisable to singe the face side of the material. This will take away any fluff that appears on the surface of the goods, and will, too, affect the depth and brilliancy of shade required.

Malting of Gray Goods

Practically all cotton fabrics of a heavy and coarse texture contain some starch dressing, such as heavily sized twills. It is a common practice to malt goods in a jigger or padder in a diastase extract. This extract is made up into a solution from one to two per cent, and heated to 140 to 150 deg. Fahr., through which the cloth is run several times. It should then be allowed to stand on the shell for several hours. Before dyeing with some classes of dyestuff the goods should be given several runs or ends through warm water.

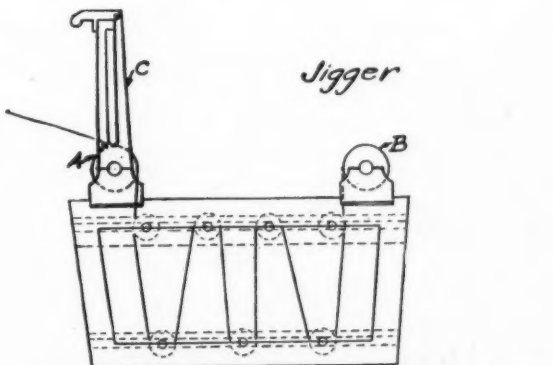
Jigger Dyeing

In jigger dyeing the following type dyestuffs are used: Substantive, sulphur, basic, vat and the various diazotized and developed colors.

The dyeing with substantive dyes on a jig is usually carried out in a plain salt water bath. Sometimes, however, soda ash is added, and in the case of heavy duck, 2 to 4 per cent Turkey red oil is used to aid in penetration. The strength of the salt present in the dye bath should, for the darker shades, be 6 to 7 deg. Tw. at a temperature of 60 deg. Fahr. The jigger is the machine most extensively employed for dyeing cotton piece goods; it admits expeditious and easy working with a small volume of dye liquor. The goods are preliminarily treated and then thoroughly washed and made ready for dyeing. The dyestuff is first thoroughly dissolved and divided equally on the first and second run. However, for lighter shades the dyestuff is added in equal portions on the first four runs. Dyeing generally takes from six to eight runs, or from three-quarters to 1 and 1½ hours, varying with the weight of the goods; the goods running at an average speed of from thirty to sixty yards per minute. A more rapid movement is not advisable. The other type dyestuffs are dyed in similar fashion.

The Continuous Dyeing Machine

The one way to get production on cotton piece goods with sulphur dye is on a continuous dyer. This machine makes it possible to dye from twenty to thirty thousand yards during a nine-hour working day. It alleviates unnecessary concern for the dyer on a large order because, if properly controlled, it will produce uniformity better than the best aggregation of jiggers could ever hope to obtain. The most advantageous way of producing results is to lay the gray goods out in sets of uniform yards. The weight and width of the goods determines the size of the set; these are made convenient for handling throughout the processing. They are preliminarily treated and then made ready for dyeing. The goods are fed into



In dyeing goods are run from A to B and returned until desired color is obtained.
After dyeing - wooden shell is placed in "C" and goods are run off Jigger

*A paper presented at the twenty-third annual meeting of the Alumni Association of the Philadelphia Textile School. All rights reserved.

a J-box, which is the source of supply for the machine, at the rate of from sixty to seventy-five yards per minute.

The speed of the dyeing machine is forty-five yards per minute. This difference in speed makes it possible to have sufficient material ahead for the machine. At all times this is absolutely essential if efficiency is desired.

It is necessary to have the continuous dyer running the working day through with the minimum stops, as every stop means forty-five yards of goods damaged and a total loss to the dyeing concern. Essential in securing a level and well dyed fabric in practically one minute is the increased concentration of the dye liquor.

Process

1. Enter dye bath: 20 to 30 per cent dyestuff varies with (a) weight of goods, (b) shade desired). Time of run in first box 20 seconds at 212 deg. Fahr.

2. Enter airdome (series of tension rails for oxidation). Time, 10 seconds.

3. Enter wash (2 tanks). Time, 20 seconds; water, 120 deg. Fahr.

4. Enter after-treatment. Two per cent copper sulphate. Two per cent sodium dichromate. Two per cent acetic acid. Time, 10 seconds; 140 deg. Fahr.

The material leaves machine and is plaited on trucks and conveyed to the squeezers, where it is washed and made ready for drying cans.

Padding of Cotton Piece Goods

Open weave piece goods in quantity can be conveniently dyed on one of the various type padders.

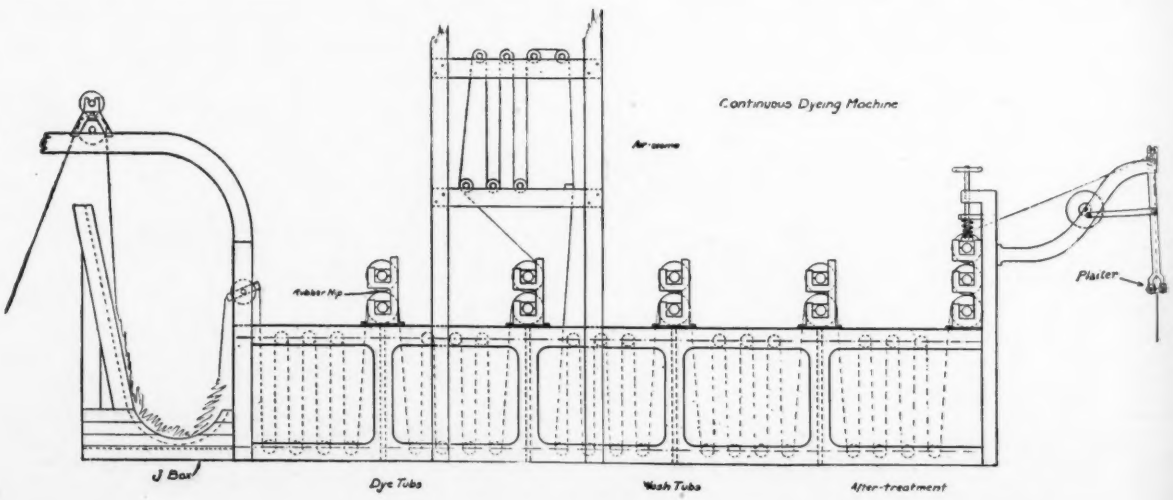
The following is a general idea of the dip type: The material passes from trucks over tension rails to a stationary bar, passing under this to a revolving scrimp bar or stretcher. This stretcher is essential as the speed of the machine and the dyeing operation are so rapid that any scrimp or double edge would cause damaged goods. The double edge getting more squeeze would dry up light and as a result the dyed fabric would finish streaked. The dye liquor is fed from two supply tanks and is continuous through a perforated feed pipe. This source of supply is regulated according to the weight of the goods and shade desired. The goods pass through the dye bath, and before passing through the brass nip are sprayed from above perforated pipe with dyestuff, direct from supply tanks. This eliminates uneven and streaked dyeing.

The goods pass from the nip and are plaited into trucks and moved on to the drying cans. The speed of the machine is from 75 to 90 yards per minute. This type machine is also used extensively in water-proofing.

Preparation of Sizing Mixture

The essential point in the preparation of any sizing mixture is accuracy. Accuracy in measuring and weighing the constituent parts is necessary to secure uniform results in the dressing. The formula will vary with the requirements of the specific case and should be balanced and adjusted after an investigation of the circumstances. In order to duplicate a sizing, the finisher must know in pounds and ounces, not buckets and shovels, as used in the past. The amount of water used should invariably be measured, not judged. To facilitate measuring, the number of gallons per inch of depth should be calculated. The starch should be added to the water gradually and the stirring of these two ingredients should be in operation at least five minutes before steam is turned into the tank. The boiling of this mixture should take place from 20 to 30 minutes. Tallow softeners should be added to the mixture before the boiling point is reached. After the mixture has been thoroughly dissolved, the steam valve is throttled to a point where the boiling is continued and yet the contents not forced from the tank.

The accuracy taken in weighing out the various ingredients at the beginning is to no advantage if the steam is abnormally wet or there should be a leaky steam valve, as either will dilute your mixture. Sometimes it is nec-



essary to purposely use an insufficient quantity of water in the beginning, and just before the boiling is completed add sufficient water to get required volume. The boiling must be continued during the addition of the water so that the mixture is boiling when the full quantity is reached.

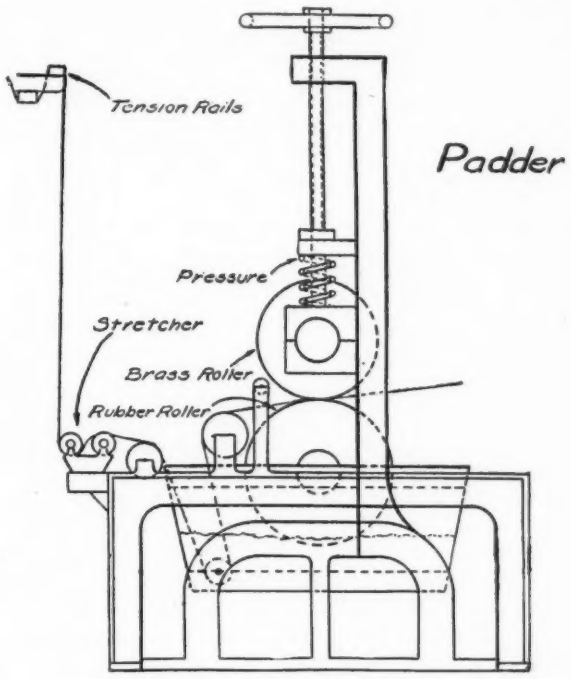
Assuming that the speed of the sizing cans is constant, there are two variable factors which should be controlled.

Sizing

1. The level of the size must be kept constant. A variation in level means a variation in the time during which the material is immersed in the size. The result is the lack of uniformity.

2. The temperature of the size in the size box must not vary. The viscosity of any mixture will vary with the temperature. The facility with which a size mixture is absorbed by piece goods will vary with the viscosity of the paste. Therefore, a constant temperature means uniform dressing, and, as a result, uniform absorption.

The finishing and weighting of cotton piece goods has come to mean much in the last decade. The fact that practically all gray goods come from the weaving mills heavily sized or loaded is the cause for most of the difficulty. This dressing must be removed to secure the best results in dyeing. After dyeing these goods must be reweighted and returned to original gray weight. This means one more concern for the dyer, as some ingredients used in putting back lost weight greatly affect the dyed shade. This is usually overcome by dyeing the color brighter to allow for toning of the size. The following formula will produce a medium finish, and, although



not standard, has proven itself after many experiments: 20 pounds starch, 20 pounds gum, 5 pounds bone grease, 6 pounds soluble oil.

The Use of Katanol in Cotton Goods Printing

The Aniline Black Resist Process—After-Treatment of the Fabric—Resist Printing—Resist White Effects—Making the Carbonate Paste—Sulphoxalate Discharging on Dyed Goods—Dyeing with Discharge Colors—Dyeing Red Shades by Discharge Process—The After-Treatment—Discharge Printing with Zinc Dust—Details of the Method

By DR. RICHARD FISCHER

Textilberichte, 1924, 119-121

Translated by Ismar Ginsberg, B. Sc., Chem. Eng.

THE author delivered an address before the convention of color chemists in Germany about a year ago on this subject, but at the time there was but little practical information available regarding the results that might be obtained with this substance in the printing of textile fabrics. Since then considerable practical work has been done on this subject, and it can now be stated that katanol is one of the most important auxiliary agents available in the printing of textile fabrics. It is, therefore, not unworthy to give a resume of the results obtained in the laboratory as well as in actual practical work since that time.

It must be mentioned right at the outset that the problem of direct printing with basic dyestuffs and katanol has hitherto been unsolved. Katanol possesses so strong a precipitating action on the basic dyestuffs that all the experiments which were made with the idea of lessening this action of the resisting agent on the dyestuff, have been unsuccessful, even when steaming was resorted to. The problem of discharging colors, in which process tannin was originally used as a mordant, which it was sought to replace with katanol, was similarly unsolved. There are still no methods available for discharging colors in a satisfactory manner with the aid of katanol, so that

a result can be obtained which could compete with the discharge agents employed in caustic solution along with tannin. Hence, at the present time the use of katanol is limited in printing to its application for the production of brightly colored fabrics on substantive dyed materials with the aid of Rongalite C or a zinc dust bisulphite mixture, and to resist dyeing by the aniline steaming process. It gives such satisfactory results in these two processes that in some plants its use has become almost standard.

The results that have been obtained along these lines in practical operation are given below.

The Aniline Black Resist Process

Formerly it was customary to use about twenty grams of katanol per liter of the dye liquor in premordanting the material to be dyed. Recently it has been found to be more advantageous to employ from seven to ten grams of the product, without seriously affecting the fastness of the resist colors to washing, which, as is known, is considerably greater than when tannin is employed as the mordant. In making the solution, from one-tenth to one-eighth of this amount of calcined soda is employed. In order to prevent the foaming of the mordanting bath, it has been found advisable to add about five grams of Monopole brilliant oil or Turkey red oil. The composition of the bath is as follows:

Katanol	7.0 to 10 grams
Calcined soda	0.7 to 1.0 grams
Water	987.3 to 184 grams
Turkey red oil	5 grams

It is clear that, even though it is very desirable, it is impossible to add the katanol directly to the Aniline Black dye bath, as the acid solution would precipitate the katanol.

Aeter-Treatment of the Fabric

After treatment in the katanol bath, the goods are dried on both sides in a drum-drying machine or on a hot flue. Then, if the goods are not to be worked up directly, they are best stored in a room which is free from all acid fumes.

The Aniline Black dye bath is easily acidified with the aid of acetic acid, or better still formic acid may be used for this purpose. It has also appeared to be somewhat advisable to increase the proportion of potassium ferrocyanide in the bath, as when this is done, the black shade, produced with the aid of katanol, is corrected for the brownish tinge that it naturally possesses. The dyed materials are then dried in the usual manner. It is interesting to note that the dyed fabrics may be permitted to remain for days before they are printed, without any development of the Aniline Black colors. Under certain conditions this is very advantageous.

The composition of the Aniline Black dye liquor is as follows:

825 grams of aniline salt.
3000 grams of water.
650 grams of potassium ferrocyanide.
320 grams of sodium chlorate.
2000 grams of water.
50 grams of aniline oil.
50 grams of acetic acid, 6 deg. Be., or the corresponding amount of formic acid.

The whole bath makes a volume of ten liters.

In the place of potassium ferrocyanide, when it is desired to produce a black with a more bluish tone, the corresponding amount of sodium ferrocyanide is employed, approximately 730 grams. A mixture of the two salts may also be used.

Resist Printing

The resist effects, when basic dyestuffs are employed, are produced to the best advantage by the aid of potassium sulphite, sodium acetate and zinc oxide. In this way the most brilliant shades are obtained. When the proper dyestuffs are selected, the resist effects are very stable. The following list includes a number of dyestuffs which have been found to give the most satisfactory results from this standpoint, particularly when the resist-printed fabrics were allowed to remain for a long time.

Red and Rose

Rhodamine B Extra, G Extra, 5G Extra, 6G Extra.
New Fuchsin.
Rhodulin Red B, G.
Safranin FF Extra.

Orange

Rhodulin Orange N, NO.

Yellow

Auramin, concentrated, O, 11, G.
Aurazin G.
Coriphosphin OX, OX Extra.

Green

Brilliant Green Crystalline.
New Green 1.

Blue

Methylene Blue B, BB, RR, free from zinc.
New Methylene Blue F.
Brilliant Rhodulin Blue GO, 3GO, 5B, 6G concentrated.
Rhodulin Pure Blue BB, 3G.
Turkish Blue BB, G.

Violet

Crystal Violet P (fairly good).
Mixtures of Rhodulin Pure Blue BB with Rhodamine B Extra.
Rhodulin Heliotrope B, 3B.
Rhodulin Violet.

Brown

Bismarck Brown R, R Extra, FR Extra, M.

Gray

New Fast Gray.

The composition of the resist printing paste may be represented by the following example:

15 to 30 grams of dyestuff dissolved in
75 grams of denatured alcohol,
25 grams of acetin and
85 to 70 grams of water and the addition of
800 grams of the thickener S,
which makes a kilogram of the entire mixture.

Thickening Mixture S

75 kilograms of British gum
60 liters of water powder in
8 kilograms of sodium acetate in
8 liters of water
8.5 kilograms of potassium sulphite, 45 deg. Be.
16 kilograms of zinc oxide
10.5 kilograms of glycerine
4 kilograms of castor oil
Making a total of 169 kilograms of the mixture.

The steamed goods are washed flat and then immediately dried in the drum drying machine.

Resist White Effects

Considerable difficulty was experienced at the outset in obtaining pure white resist effects with katanol due to the fact that the treatment with this substance produced a grayish yellow tone which it was found very difficult to remove from the fabric due to the substantive character of the katanol. The improvement made in the quality of this product has reduced these difficulties. The reduction of the proportion of katanol used has also had its beneficial effect on the whiteness of the resist effect. On the other hand, up to the present time, absolutely perfect results in comparison with other resist whites on goods which are free from katanol have not been obtained. The author's investigations along these lines have recently shown that precipitated zinc carbonate, which has been recommended for some time in the past as an addition to rongalite discharging compositions used on silk weighted with tin salts, can also be used with advantage in producing white resist effects in place of zinc oxide which often has a yellowish tone. The results were very satisfactory and an example of the composition used for this purpose is given below:

White Resist ZK

200 grams of zinc carbonate, 20 per cent paste.
350 grams of potassium bisulphite, 45 deg. Be.
230 grams of sodium acetate.
220 grams of gum tragacanth solution, 65 parts of the gum to one thousand parts of the solvent.
1 to 2 grams of ultramarine.
Which makes 1,000 grams in all.

When a small amount of Rongalite C is added to this paste, even better results are obtained with it. The zinc carbonate paste, 20 per cent concentration, is made in the following manner.

Making the Carbonate Paste

A solution is made of 180 grams of sulphate of zinc in 400 grams of water. After the salt has completely dissolved, the solution is added to another solution of 67 grams of calcined sodium carbonate, which have been previously dissolved in one liter of water. The two solutions are mixed together thoroughly to insure complete precipitation of the carbonate of zinc. The precipitate is allowed to settle and the clear liquor is decanted and finally filtered. There are obtained in this way about 200 grams of the zinc carbonate paste.

Sulphoxylate Discharging on Dyed Goods

Tannin, which, it is claimed, can be easily displaced by katanol in discharge printing processes, cannot be considered at all in this case, for, if it were used, the basic dyestuffs would be instantaneously and quantitatively precipitated. Hence, it is necessary to treat the goods with katanol before they are printed. In accordance with general practice up to the present time, this does not have to be done right after the dyeing process; it is possible to re-dye with katanol, which is an important matter in that it is very time-saving.

It has been found that in dyeing with benzidine dyestuffs the required amount of katanol can be added directly to the dye bath. Generally from 2 to 3 per cent of katanol is sufficient, figured on the weight of the fabrics being dyed. When dyeing with azo dyestuffs, it has been found to be advantageous to add the katanol to the second rinsing bath, after the development of the color. Then the fabric is allowed to run on the jigger for about three revolutions at a temperature varying between 40 to 50 deg. Cent. Then it is permitted to remain there for half an hour and thereafter it is rinsed a little and dried.

If it is desired to use katanol in dyeing fabrics and obtaining a finished, dry product, then the dye bath, having the following composition, is used with advantage.

20 grams of katanol.
2 grams of calcined sodium carbonate dissolved in one liter of water.
10 grams of Monopole brilliant oil.

Important Details Regarding Dyeing with Discharge Colors

The fact that it is not possible to incorporate the katanol direct with the discharge colors is in this case of the highest importance to the fabric printer. The printing colors, which are composed of the dyestuff, the solvent, the thickener and Rongalite C, are remarkably stable in contradistinction to the color pastes and preparations that contain tannin and aniline oil or phenol and the like. In the latter mixtures, it is undoubtedly true that the dyestuff exists in the state of partial precipitation. Then again, due to the slimy nature of the prepa-

rations, they are apt to smear up and coat the printing rollers, a fact known to every color chemist and technologist.

That the dyestuff is partially precipitated in these preparations also means that the color pastes are not used economically. The tannin lake, which is precipitated in the color paste, no longer possesses the ability to dye cotton fabrics. It is lost in the wash waters and the colors printed on the goods by the discharge process are not fast to rubbing.

It is claimed, on the other hand, that the goods which are subjected to treatment with katanol are better able to fix the dyestuff, and that this results in a saving of color amounting to 20 per cent at a minimum. In this connection it must be mentioned that the sulphoxylate is contained in perfect condition in these color pastes. It has also been proven in practical work that the use of katanol results in a reduction in the amount of rongalite that is required in the printing process.

Dyeing Red Shades by Discharge Process

A particularly complete and economical use of the color paste is experienced in the dyeing of red discharge effects by means of the rhodamines. These dyes up to the present time have not given very good results when used for this purpose. Too much dyestuff had to be used to get the desirable red and scarlet effects. On the other hand, it is said that when the fabric is treated with katanol there is no difficulty in obtaining full tones with these dyestuffs, and, furthermore, the dye liquors are well exhausted. There is an important saving in this process over that in which tannin is employed. Another important point is that the economy of the process increases as the number of colors used in printing the designs increases. In the tannin process each time that another color is employed in the printing of the fabric, an excess of tannin and aniline oil must be provided in each case. In the katanol process one treatment of the fabric with this material is sufficient for the entire printing process.

In printing designs in variegated colors on fabrics with the aid of katanol, the following paste composition may be employed:

30 grams of basic dyestuff which is dissolved in
70 grams of denatured alcohol
30 grams of acetin and
270 grams of water, to which there are added
400 grams of British gum in solution 1 to 1 and
200 grams of a thickener composition.

The thickener composition is made in the following manner:

120 grams of Rongalite C and
140 grams of gum tragacanth, 65 in 1,000 are mixed with
60 grams of water, making a total of 320 grams.

If the colors, as is often necessary in printing calico by the raised style process, are required to print through the fabric, then the proportion of alcohol is increased several per cent.

The following dyestuffs are very well suited for discharge printing in variegated colors.

Red and Rose

Rhodamine B Extra, G Extra, 5G Extra, 6G, 6G Extra.

Orange

Rhoduline Orange NO.
Auramine G.
Aurazine G.
Coriphosphine OX Extra.

Green and Olive

A mixture of the blue and yellow dyestuffs.

Blue

Rhoduline Blue GO, 3GO.
Rhoduline Pure Blue SG.
New Methylene Blue F.

Violet

A mixture of blue and Rhodamine B Extra, G Extra.

Gray

New Fast Gray.

There are also a few dyestuffs of the gallo series, such such as Coelestine Blue B, Gallo Gray 2BD and Gallo Violet, which may be employed for this purpose and give good results when discharged on katanol-mordanted fabrics.

In obtaining white discharge effects a normal Rongalite White is printed with the addition of anthraquinone.

Details of the After-Treatment

The steamed goods are well washed and then are sent immediately to the drying machine. When the operations are conducted in such a fashion that the goods must be placed on the trucks before they are dried, then it is recommended that they be passed through a weak solution of katanol in the washing machine. This is done for the purpose of fixing the unprecipitated dyestuff, and when this is done spotty fabrics are avoided. There are no special precautions to follow out in washing the goods in the vats.

It must not remain unmentioned that because the substance possesses a certain yellowish tone of its own, katanol has the effect of causing some change in the color of the dyed or printed fabric. However, when the fabrics are very thoroughly washed after the steaming process this alteration in the color of the dyed fabrics is reduced to such a minimum as to be of no account whatever. It is, of course, entirely possible and practical for the individual dyers to devise their own methods of getting around the coloring effect of the katanol by neutralizing it through the addition of the proper supplementary color.

Discharge Printing with Zinc Dust

In conclusion, the author wishes to say a few words regarding the use of katanol as a mordant in discharge

printing with the aid of zinc dust. It is well known that these discharge preparations, which are only to be considered in the case of hand printing, possess certain great advantages over discharge preparations which are made with the aid of rongalite. One advantage is that the printer can better see what work he is doing, and, furthermore, it is possible for him to secure good results even when he uses rather primitive steaming apparatus.

The greatest disadvantage of the zinc dust discharge printing process up to the present time has been that only with the greatest difficulty was it possible to obtain therewith colored effects on the goods. The reason for this is simply that most dyestuffs are precipitated by tannin. The introduction of katanol into this field has resulted in the removal of this disadvantageous condition, as now the printer is able, just as in the case of rongalite, to obtain the brightest shades in the discharge printing process without any difficulty.

Details of Method of Working

The method of working is in principle the same as that in the case of rongalite discharge printing with bright colors. The goods, after diazotization or dyeing in the dye bath or in the wash bath, are treated with katanol in a slop-padding machine. They are then dried and printed with a zinc dust discharge preparation. An example of such a preparation is given below.

The constituents are:

20 to 60 grams of the dyestuffs which are dissolved in
50 grams of glycerine
130 to 190 grams of water, to which there are added
780 grams of the primary discharge paste in the cold and
20 grams of pulverized Rongalite G.

The whole then makes one kilogram.

The method of making the primary discharge paste is as follows:

330 grams of rubber solution 1:2 are mixed with
330 grams of sodium bisulphite, 38 deg. Be.; the mixing is conducted carefully with cooling, and then there are introduced
334 grams of zinc dust.
This makes a kilogram of the mixture.

The dried goods are then steamed for a period of twenty to thirty minutes in the usual manner, then oxidized with a mixture of bichromate and acetic acid, thoroughly washed, acidified and finally washed again. As far as the author knows, this is the general process that is used at the present time in the discharge printing of bright shades on artificial silk fabrics, after they have remained for quite an extended period of time on the printing machine. Good results have been obtained, which up to the present time have been rather doubtful as the sulphoxylate process was not reliable enough for such work.

FABRICS FINISHING BY CONTINUOUS PROCESSES

Piece fabrics are now scoured, fulled and, in some cases, bleached or dyed, as well as dried by continuous processes. In a combined scouring and fulling process the fabric is fed in the open width to a pair of squeezing rollers, obtains a certain amount of milling in a cuttle box, and passes through the scouring liquor back to the rollers. The machine is closed up and the processes of scouring, squeezing and fulling go on continuously for the time required, usually about an hour. The fabric is generally rinsed in the same machine. The bleaching and dyeing of piece fabrics is also carried out by the continuous treatment in the open width.

Another important finishing operation of a continuous character which at present can only be performed successfully on cotton or mixed knitted goods is that of calendering. This is a combined pressing and ironing operation, and in the better types of machines the tubular fabric, after being expanded to the desired width, is passed between a steam-heated roller and a traveling felt apron, which is moving at a different surface speed from that of the roller, and afterward subjected to a similar treatment by another roller and apron, so that both sides of the flattened fabric tube get equal treatment.

This method of finishing tubular fabrics is quite as efficient as that of pressing and the work is performed in but a fraction of the time. Unfortunately, though many types of feeding mechanism have been tried, wholly satisfactory results have not yet been obtained in the treating of all-wool fabrics by this method, so that soft fabrics like cashmere and botany have still to be finished under the press. Eventually, however, the difficulties encountered by keeping a straight course and wale on this class of fabric should be overcome.

Plain and fleecy tubular fabrics are often brushed in a continuous manner by means of the planetary napping machine. This machine consists of a large cylinder or swift, which carries two series of horizontal rollers covered with wire carding. One set of rollers advances and felts the fabric while the second set raises the fleeces or pile. The rollers of the two series alternate, possess different forms of wire carding, and are rotated at different speeds. Usually a form of cone drive is employed, so that the ratio of speeds of the two sets of rollers can be varied at will.—Posselt's Textile Journal.

AMERICAN INSTITUTE TO HOLD BIG EXPOSITION OF INVENTIONS

Handlers of cleaning and dyeing equipment and accessories will be interested in the Exposition of Inventions to be held December 8th to 13th inclusive, 1924, in the famous Engineering Societies Building, New York City. The American Institute of the City of New York is handling this display through its Inventors' Section.

A feature of the exposition will be exhibits from the leading American industries showing developments of various machines, utilities and processing methods.

The Action of Light on Dyes Applied to Cotton Fabrics*

A Summary of the Literature

Part I

Comparative Tests of Fading—Some Experimental Data—Absolute Measurement of Fading—Color Nomenclature—Color Notation—Instruments Employed in Color Measurement

By PERCY WALMSLEY CUNLIFFE, Ph.D., A.I.C.

The British Cotton Industry Research Association

IT must have been apparent from early times that the colors of some dyed fabrics changed more or less rapidly on exposure to sunlight, while others changed very slowly or not at all. The search for colors which are fast is no doubt as old as their use, but it is only comparatively recently that attempt have been made to investigate the action which takes place when a dyed fabric is in the process of fading. The problem has been attacked from many sides and somewhat widely differing views are held. Perhaps this is not unexpected, considering that the majority of workers have dealt with a few dyestuffs only and from their results have attempted to evolve general theories embracing all the variedly constituted colors. The problem is admitted by most to be exceedingly complex and a solution, or rather solutions, can only be reached by a systematic study of the effect of each of the many conditions involved, always remembering that dyestuffs vary so enormously in constitution that a single all-embracing theory is impossible from the known facts of photo-chemistry.

On the practical side it is generally agreed that the greatest requirement is the standardization of the conditions under which the tests are carried out. Perhaps an important solution of this will be found in the production of a source of light giving results identical with those of sunlight of agreed composition.

The following report summarizes most of the knowledge available on the problems of dyed cotton.

Comparative Tests of Fading

The greater portion of the work on the fading of dyes has been carried out by one of two comparative methods. In the first, one-half of a test piece is exposed to light, while the other half is shielded, or alternatively a test piece is exposed to light, while an exactly similar piece is kept in a dark enclosure. This method has been used by Robinson[64]† (1921) and Kaufman[41] (1921) among others. The latter considered a dye which withstood exposure on a fabric for one month to summer sunlight without showing any appreciable change as "absolutely fast"; if only two weeks, "fairly fast"; if one week, "moderately fast"; but if affected in a day or so, "fugitive."

In the second method the rate of fading of test pieces is compared with that of an arbitrary standard when both are exposed under identical conditions. In general, the standard chosen has been one which possesses a high resistance to light, so that the majority of other colors fade at a more rapid rate. The standard has generally been described as "fast" or "very fast," while the test pieces fall in categories ranging from this to "fugitive."

The desiderata of a color standard were held by Scheurer[66] in 1898 to be, firstly, that the color must be fixed on the cotton directly without mordant, as the latter exerts an influence on the fastness; and, secondly, that the color selected must be moderately resistant to the action of light. He considered that Indigo met these requirements, and took three shades of color; namely, deep, medium, and light, corresponding to 4, 2 and 1 dips. A color was said to be of "good fastness," "moderate fastness," "poor fastness" or "fugitive" if it corresponded in resistance to light to the deep, the medium, the light, or was inferior to the light shade of Indigo. Indigo was also used by Ermen[16] (1910) as a standard. A modification of this method, designed to yield a more exact determination of the fastness of dyes, and involving the use of an actinometer, was given later by Scheurer and Brylinski[67] (1898).

A different type of standard was employed by Robson[63] (1918); namely, one which faded considerably faster than the average sample tested. Strips on filter paper dyed with Eosin GGF (Cassella) were exposed together with the test piece, and the standard was replaced successively by others when it had faded, until finally the test piece had also faded. A certain number of standard papers was thus found to be equivalent to each sample, and this number was taken as representing the fastness of the latter. The fastness of most of the dyes tested was given by numbers between ½ and 6. The method was criticized by Haley[32] (1918), however, on the ground

*Published in the Journal of the Textile Institute.

†Figures refer to Bibliography, to be published following conclusion.

that it makes no allowance for the difference in color or depth of shade between the standard and the test piece. He suggested that five or six graded samples should be chosen as standards in each of various colors; for example, yellow, orange, red, green, blue-violet, brown and black. These standards would be denoted by letters representing the hue and by numbers representing the shade, even numbers only being used, so that any test piece falling between two standards would be represented by an odd number. As an example, E2 would represent a blue of the poorest fastness and might be, say, Dianol Brilliant Blue 6B. It would be necessary for the same grade numbers in each shade to represent dyes of practically equal fastness. The compilation of such a series of standards would involve considerable labor, but Haley thought the resulting advantages would justify the trouble involved. The more scientific method of measurement of color, and therefore of color change, would appear to be preferable to the use of a series of standards.

Hayes[37] (1922) has observed that in practice it has to be remembered that the fastness to light of a color can show differences according to the depth of the dyeing, and this property is also influenced by the texture of the dyed material, cloth with a smooth surface generally indicating a higher degree of fastness than that with a rough surface. Comparative exposure tests must herefore be made with dyeings not only of the same depth of shade but also on the same material (compare Setlik[72]). In this connection it may be noted that Hannay[34] (1912) considered that dyeings on mercerized cotton are rather faster than similar dyeings on unmercerized cotton, but the truth of this had been denied by Krais[44] (1911).

In the majority of the comparative measurements of the fading of dyes, sunlight has been employed; but while some investigators have exposed unprotected test pieces—Scheurer[68] (1910), for example, maintaining that this condition is necessary for the production of consistent results—others have protected them by means of glass. The method of exposure recommended by the German "Echtheitskommission"[27] in 1916, and also used by Whittaker[51] (1913) and others, was the so-called "roof test," samples being suspended free in air, but under glass, on a roof for thirty days and nights. The commission proposed to express the results on a scale of eight grades or norms.

Brownlie[7] (1902) and others,[16] on the other hand, exposed test pieces behind a glass window indoors, a method which is recommended by Matthews[56] (1920), but Hayes[37] (1922) states that while acid and basic colors should be exposed under glass, chrome colors should be exposed in the open air.

Some Experimental Data

A large number of comparative tests have been carried out by various workers.[6, 50, 59] Ermen[16] made a study of the fastness of some scarlet, red and orange vat colors, and his results indicated that many of these colors were not nearly so fast as they were generally supposed to be, for of twenty dyes investigated only five were classified as very good. His results have recently been generally confirmed by Greenhalgh[29] (1922), who investigated about seventy vat dyes of many different colors. Brownlie[7] (1902) investigated the benzidine colors and de Puyster[63] (1921) the principal red dyes, while a study of the leuco bases of the triphenylmethane dyestuffs was made by Gros[30] (1901), the problem being considered chiefly from the aspect of pure photo-chemistry.

For details of the fastness of many dyestuffs the Colour Index published by the Society of Dyers and Colourists (1923) may be consulted. In the introduction to the Index it is stated (for wool and apparently also for cotton) that "the dyed material is exposed in the open air facing south for one month" and examined at intervals. Presumably the details given are taken only from the results of those investigators who have exposed their samples unprotected in this manner. Fastness is expressed on a scale of 5 norms, one being applied to those dyes which are not perceptibly altered in one month, and five to those dyes which are considerably faded in one day.

ABSOLUTE MEASUREMENT OF FADING

Color Nomenclature

As considerable confusion of nomenclature exists in the literature of color, it is necessary to define the terms which will be employed subsequently.

The following definitions are taken from the textbook of Martin and Gamble[55]:

"*Color* is a term given to the sensations due to those qualities of light by which an eye may recognize the form and nature of an object. Colors are said to differ in hue, in saturation or purity, and in brightness . . . 'black' is the negation of color."

"*White* is the color of sunlight passing through a minimum thickness of the earth's clear atmosphere, while the sensation is not caused to normal-sighted persons by light of any single wave-length."

"*Hues* are those characteristics of color sensations by which these may be distinguished apart from their brightness or whiteness. Thus 'white' is a color but has no 'hue.' 'Hue' generally appears when some of the wave-length constituents of white light are removed."

"*The saturation, purity, or chroma* of a color refers to the proportion of brightness of the pure hue sensation to the total brightness of the color. If to a pure hue increasing amounts of white are added (the total light being kept to a standard intensity), a *tint* series or series of differing saturation is formed. Again, with any member of the same series the 'brightness' may be varied from zero upwards until a dazzling bright-

ness is obtained, thus giving a series of *shades* of the pure hue."

The remarks of Luckiesh[53] may also be quoted: "White is not a simple color but is merely the color of sunlight, and probably owes its apparent homogeneous character to the fact that it is the average color of the light which fills the eye when at rest. The colors of the various objects which we see around us are not due to any power possessed by these objects of creating the colors which they exhibit, but merely to the exercise of a selective action on the light of the sun, some of the constituent rays of the white light with which they are illuminated being absorbed, while the rest are reflected or scattered in all directions, or, in the case of transparent bodies, transmitted. White light is thus the basis of all other colors, which are derived from it by the suppression of some one or more of its part."

Color Notation

It is well known that most colors can be reproduced, so far as visual sensation is concerned, in one of several manners, namely: (1) By arranging certain values of the three variables—hue, saturation, and brightness; (2) by the mixing of red, green and violet spectral lights, those being the so-called "primary colors," and (3) by the subtractive action on a beam of light of the primary colors when used as light filters and placed in series. In each case the use of three symbols enables a color to be specified completely. In practice, (1), or the monochromatic method, has been employed chiefly in the more scientific investigation of color; (2), or the trichromatic method, has been fairly extensively used in the problems of fading and of color matching, while (3) has apparently been applied in one or two cases only.

Instruments Employed in Color Measurement

Monochromatic Instruments.—The Nutting colorimeter is of great value in determining the hue, saturation and brightness of a color. In this instrument three beams of variable intensity are employed, two being sunlight or artificial daylight, while the third is monochromatic. By adding white light to the monochromatic, a comparison is made in the photometric field of the resulting light and that reflected from the test surface, and the value of the latter in terms of hue, saturation and brightness may thus be determined.

For the measurement of the reflection coefficient only of a surface two instruments have been used; namely, the early color-patch apparatus of Abney and the Koenig-Martens spectrophotometer in conjunction with an "integrating cylinder."

A monochromatic method involving the use of color-sensitive photographic plates was worked out by Gebhard[18] (1910), the underlying principle being that as exposed colors may become lighter, darker or of a different hue, the amount of color remaining unaffected may be taken as a measure of fading. The pattern was photographed on an orthochromatic plate behind a filter corresponding to the shade of the color, under which conditions only such rays as were reflected from unchanged particles of the color would pass through the filter and act upon the plate. The latter was then developed with a standard developer and the difference between the photographs of the faded and unfaded parts of the pattern determined by means of a scale of gray of 6 to 10 gradations. The method was subjected to adverse criticism[36, 42] on the grounds that the amount of color left could not be taken as representing the fastness in cases where the whole of the color underwent a series of changes, since there would be no unchanged dye remaining, and, further, a photographic plate has a color sensitivity differing from that of the eye. It would seem, however, that the latter objection could be met by the use of a panchromatic plate in conjunction with a suitable filter designed to yield correct color rendering.

Trichromatic Instruments Based on Additive Color Principles.—The earliest form of instrument employed the rotating sectored disk,[55] the action of which rests on the fact that the amount of light passing through it is proportional to the angular opening of the sector. By placing colored filters over the sectors and allowing white light also to pass, any combination of hues, white and black (that is, gray), and brightness can be obtained, and thus any color can be reproduced. If the test piece is placed as a narrow band round the circumference of the disk, and colored, white and black pigments are placed an variable sectors on the remainder of the disk, a match can be found on rotating the disk.

Klemperer[32] (1911) employed the apparatus of Kallab,[40] which is designed to reproduce any given color in terms of three primary colors and gray. Four transparent rotating disks are used, the first three carrying the primaries, red, yellow and blue, each disk being divided into ten sectors, which are colored with dyestuffs in ten graded shades, the latter being so arranged that an equal number of each color gives gray. It is thus possible to express any color in terms of red, yellow, blue and gray. The results obtained with Fuchsine and Methylene Blue may be quoted as examples of the application of the method.

FUCHSINE

Primary Colors	Original	——After Exposure for—— 2 Mos.	3 Mos.	6 Mos
Red	9	3	3	2
Yellow	1	1	1	1
Blue	2	1	1	1

METHYLENE BLUE

Primary Colors	Original	——After Exposure for—— 2 Mos.	3 Mos.	6 Mos
Red	0	1	2	1
Yellow	0	2	3	1
Blue	7	7	5	2

(*Continued on page 452*)

Proceedings of the American Association of Textile Chemists and Colorists

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TEXTILE MANUFACTURER, RETAILER AND CONSUMER*

By RICHARD E. STEED

I was asked some few weeks ago by a committee representing the Providence Section to address you this evening on a subject concerning the relationship existing between the manufacturer, the retailer and the consumer. Your committee agreed that this would be a capital subject to talk upon, and I likewise agreed from the merchant's standpoint. This subject is rather a sensitive one from the viewpoint of the customer. On the other hand, I am going to place some of the blame upon the manufacturer. It really does not matter where the blame lies; but from the merchant's point of view, he is the man who really suffers.

To cover the subject clearly we secured first-hand information from our different department managers who are in actual contact with the manufacturer from whom they buy, and the customer to whom they sell.

I want to say that a clearer understanding between the manufacturer, the retailer, and the consumer would be almost invaluable to all concerned. We must know each other.

I shall now give you word for word, exactly, the unbiased opinions of these department managers.

SILK DEPARTMENT

Within the past ten to fifteen years the average retail customer has shifted the responsibility of merchandise not wholly up to the standard to the retail merchant. This seems true of every department of our life—the general unwillingness to shoulder responsibility when and where there is a chance of passing it on.

If a customer in a retail store meets with a mishap either to her person or her clothing, the first thought is, "How can I blame the store?" Many cases might be cited along these lines, but rarely do they assume responsibility for damage incurred by themselves. Sufficient for this purpose is that the public to-day is looking for a *greater amount of perfection* in merchandise, generally, than ever before. It matters little to them what loss or inconvenience may occur to the merchant; *their purpose is self-satisfaction.*

There are many reasons for this attitude. It may be the merchants who are to blame. In the competition for business, there are and have been many reckless promises made in the name of service. Be that as it may, the point of fact and interest is how to best meet this changed relation between the merchant and customer, and who is to meet the losses incurred. (Note, we do not mention the manufacturer.) From the piece goods standpoint, I believe there is a greater desire on the part of the manufacturer to produce more perfect weaving and colors than seemed evident a few years ago. *There is still room for improvement.*

When merchandise is bought as first choice it ought to be the exception to find it otherwise.

1. A closer inspection on the part of the examiner of finished merchandise seems necessary.

*An address delivered before the Rhode Island Section of the American Association of Textile Chemists and Colorists, May 9, 1924.

2. When imperfection is found, an indication mark on selvage should be rigidly adhered to.

This would help the retailer to eliminate serious trouble later.

For instance: A length of silk is sold for a gown. No indication of defect. The customer cuts the material and has all placed for making when an unsightly blemish appears in some conspicuous part of the gown. (Note, the material has been cut.) This always means a new length of material to replace the damaged one. What happens when there is no material left like this one? Who *pays* for the loss? The retailer? Yes. The manufacturer? No.

You may say: The sales person ought to discover it when measuring, or the dressmaker ought to discover it before cutting into it. This may be true in part, but the idea is this: The retailer assumes the goods are perfect. He gives that impression to his customers, creating an atmosphere of confidence that he, the merchant, is dealing in first-class merchandise.

Then there is the question of water spotting which detracts from the appearance of all silks and fine cottons. Something could be done as is done by the makers of spot-proof foulards. This would be a great selling point for all crepes and a lessening of serious losses to the users of silks.

There are materials manufactured that are known to have little or no wearing qualities, and for different reasons are demanded by the public. These materials are used for linings, and other purposes, for which they are absolutely unfitted, and we, as retailers, believe that a notice or slip or something to indicate that the goods are not recommended for wear be placed with the materials, so that when the goods "fall apart," as we will say, from strain or otherwise, the responsibility will not fall upon the retailer, but the purchaser.

There is not a doubt but that many adjustments made are unwarranted; sometimes through ignorance of merchandise on the part of the customer, and sometimes with the stretchable end of conscience, fully extended. But generally, I believe that the majority feel they have a grievance and very honestly apply for compensation. We wish *you* to assume a *customer's position* if the retail adjuster refuses to satisfy her demand, and humiliates her pride by placing the blame on herself. How many of you would go back to that store? All depends upon the retailer and his policy, whether liberal or otherwise. So you see, as the merchant, we are compelled to make good. The manufacturer still remains out of it.

The real modern store of to-day will always try to satisfy a customer whether the claims are just or unjust. In most cases they are settled between the customer and the retailer. *It is not hard to determine who* is to blame for the merchandise if it prove unsatisfactory in any way. The customer many times is at fault. In the case of merchandise proving unsatisfactory, why should the retailer assume all responsibility without even being allowed to present his case to the manufacturer?

The sense of suitability of dress does not have a place in the thought of the modern girl. This being a fact, it is necessary that manufacturers must not only estimate the wear and tear, but consider the necessity of dyeing fast colors to stand the test that the fabric is put to. What can be the use of many of the delicate colors dyed in silk fabrics, if they are not washable?

A certain manufacturer of fine silks guarantees that any color, including black, will stand the test of washing without interference to the color or finish.

Dry cleansing does not meet the need as that is both expensive and uncertain. Many resort to re-dyeing to some darker shade when the colors are faded or unfit for wear.

Drapery Department

Foreign-made materials have a certain added attraction to the discriminating customer, though in many materials the texture is no better than that which is manufactured here. The word "imported" has great selling power. Cretonnes of English and French manufacture are made in more daring designs, finer in blend of colors, and have not been copied or duplicated in *quality* by the domestic manufacturer, and therefore are in a class by themselves. The colors are more prominent; generally the cloth is of finer texture, and they are therefore more desirable for many uses. Domestic cretonnes are of lower cost and satisfactory only for shorter range of service.

Drapery fabrics and sunfast materials are now manufactured in this country in quality and styles *far ahead* of foreign goods of the same grade. The domestic manufacturer has worked with the consumer to produce colors and designs which can be used for all types of decorations, and with this the guarantee attached to the color fastness when given by a responsible firm carries great weight in the selling of the goods. Reliable manufacturers who have extensively advertised their lines have created a constant demand for them, and no trouble is experienced in their satisfactory service to customers.

Care must be used, however, by the buyer that the price attraction does not prove the strongest factor, as many mills are offering inferior sunfast materials where the colors will not stand the test of time. They are inviting many complaints from the customers in the matter of goods fading.

The discriminating woman when furnishing her home soon forgets the price she paid when the merchandise gives satisfactory service. Complaints are registered from unsatisfactory cloths that could be overcome by the sale only of merchandise which a concern can consistently stand back of.

The most frequent cause for complaint in this line of retailing is the lack of *standardization* of colors, it being practically *impossible to get two shipments of the same color number,* same material and made by the same mill that match.

The variations are such that it is impossible to convince the customer that the color is the same. For instance, we will say that we have completed work in a home, or we have done a certain amount of work in a room and that both require more material at a later date. We have found it impossible in most cases for the retailer to have the color matched identically, and the result is a dissatisfied customer—dissatisfied to this extent that she bought the goods, had them cut, and possibly made up and yet she cannot complete her work with the same coloring. The result is that she is compelled to ask the retailer to take back these goods even though they are cut, claiming that we are at fault because we are unable to match the coloring, and the store policy is that the customer must be satisfied. The goods are taken back and in many instances have to be salvaged at a great loss to the retailer. Is the retailer to blame or the manufacturer?

This happens in almost every line, more particularly with velvets and plain colored fabrics. Recently we upholstered in velvet a set of furniture, the color of which was taken from the sample book. The velvet when placed on the furniture seemed to the eye to be several shades darker, so much so that the customer practically declined to accept the work until the difference in shading was explained. The shading, to our knowledge, was talked of before the order was taken, but those are things customers soon forget, and it is our experience *that we have no good reason to offer* if the same goods, same color and number do not match.

Rug Department

The development of floor coverings in the last ten years has been amazing, particularly of high-grade merchandise, such as the weaving, colorings, etc., using the very best of *imported yarns.* To-day one can take a high-grade domestic rug and have it washed, scoured or mended the same as a hand-made Oriental. This is being done every day in the year, and has proven most successful. For instance, take a case that happened at the Gladding Dry Goods Company, in Providence. On November 6, 1922, a rug was on our main floor directly in front of the elevators for thirty days, and during that time approximately 100,000 people walked upon it. It was then taken up and returned to the manufacturer to be washed and scoured. When returned to our department it looked like a new rug direct from the mill, thus demonstrating to the public the weaving and dyeing qualities of the high-grade domestic rug.

A Philadelphia manufacturer has been making three high-grade rugs which stand out very prominently in America to-day. The French Wilton rug which they weave carries their name woven into the back. The majority of all high-grade rugs carry the manufacturer's name. This will not be found in medium or low grade floor coverings.

The dyes used are made in America and considered to-day to be of the very best. This has all taken place in the last few years. Prior to this we depended for the most part on foreign dyes.

A Philadelphia manufacturer weaves a rug called the Imperial Bundhar. This particular type of rug has a very high pile of a half-inch thickness, similar to the Austrian hand-tufted rug, which if bought to-day in America would cost five times more than this domestic rug.

A Worcester manufacturer no doubt makes as fine a Wilton rug as is made in America, with a beautiful luster and sheen, using the finest of foreign yarns and American dyes. It comes to the merchant direct from the loom, no middleman or jobber, bringing its own testimonial. The dyes, the weaves and construction are the finest, and are made by honest workmen proud of their skill and art. Their Anglo-Persian grade, which is the best, can be washed and scoured, like an Oriental rug. On visiting the mill, they are glad to show one how this is done, proving that the dyes are compelled to be up to the standard, otherwise the rug would bleach out. Rugs of this make after being scoured look like new rugs, though they may have been in use for years.

As to lower grade goods, this would be utterly impossible. The backs in this class of goods are sized with paste or filling, making them stiff and hard, and from a selling standpoint the impression is conveyed to the customer that she is getting a heavy rug at a low price. In the course of a year or so this rug will work together, having lost its sizing, and will become very flimsy, which is characteristic of this type of floor covering. In reality, such merchandise is only sold to cover the floor, and not for durability and service.

The price on practically all high-grade floor coverings to-day is one, whether you buy in Chicago, New York or Boston, or Providence. The price is stipulated by the manufacturer. But in middle or lower grade goods there is a juggling of prices throughout the United States, due to the character of merchandise, a most unsatisfactory condition detrimental to the manufacturer, the seller and the purchaser.

Hosiery Department

It is our belief that one of the greatest developments in manufacturing has been shown in hosiery. A few

years ago the only real dye that was known to be fast was the foreign dye. Black cottons, lisles and woolens dyed in this country a few years ago were absolutely unreliable, and in most every case after being worn a very few times would turn green. To-day we are pleased to say that many manufacturers are turning out wonderful hosiery both in texture and dyes. One manufacturer that we have in mind, instead of trying to manufacture something a bit cheaper than his competitor, is trying at all times to make it better. The result is that at this writing his orders cannot be filled for six months to come. This manufacturer believes in producing the best and not the cheapest, and his reputation is known far and wide.

We are still dependent on the English and Scotch manufacturers for good wool hose, golf hose, etc.

Cotton Wash Fabrics

Colors in cotton wash fabrics have improved since the war. In recent years wonderful developments have taken place in the weaving, dyeing and finishing of cotton fabrics in this country. Before, we were absolutely dependent upon the foreign market for fine wash fabrics, which were brought into this country and sold by a majority of the better stores. I do not want to convey the fact that imported cotton wash fabrics are not being brought into the country to-day. They are, and in greater quantities; and they still maintain the high standard of weaving, dyeing and finishing. In the past season there has been a noticeable reduction in price. This would apply to staple merchandise as well as novelties.

It does seem as though the American manufacturer should be the originator rather than the copyist, but our experience in the retail end has proven beyond a doubt that the early importations of merchandise from the other side are copied directly and sold at a lower price than the foreign merchandise, but at a sacrifice of quality.

Conclusion

I have told you what each department manager has told me; what he or she thought would be most interesting to the manufacturers and their executives gathered here this evening. We believe in concerted efforts by the manufacturer, retailer and consumer along the lines of an educational campaign advising people about merchandise they are buying, describing its good qualities and stating whether or not any precautions should be taken relative to wearing qualities or dyes, etc.; these facts should be truthfully put up to the consumer so that when she buys she will buy intelligently.

I am not aware to-day that you have a national organization among the manufacturers, but if such an organization exists it would be well for them to get in touch with the National Retail Dry Goods Association and between these two organizations an educational campaign could be worked out that would not only benefit the customer and the retailer but the manufacturer as well. The retailer to-day is working along entirely different lines than he did a few years ago. "Truth in advertising" is the policy of practically every good store in the United States. Our work is checked up constantly. If goods advertised are not as represented we are immediately criticized for it. The campaign has worked wonders. I could cite many cases where goods have been advertised and misrepresented, and the advertiser has received very sharp criticism. In fact, in many cases he has been made to correct this advertisement the following day in the newspaper.

Regarding the standardization of colors, so much could be said about this that I believe we could talk on the subject for hours. To the minds of the retailers to-day the color problem is far from the point of perfection or standardization.

We can continue doing business as we are doing it, and so can the manufacturer; but we believe that closer co-operation and a better understanding could be brought about between the manufacturer, the retailer and the consumer whereby all would be benefited.

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AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
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Directing Editor

Published biweekly by
HOWES PUBLISHING CO., INC.
90 William Street, New York City

A. P. HOWES, *President* E. S. PREDMORE, *Secretary*

Subscription price $5.00 per year; Canadian $5.50; foreign $6.00

Vol. XIII June 30, 1924 No. 11

THE DYESTUFF INDUSTRY'S FUTURE—A MATTER OF POLICY

THE report of Federal Trade Commissioner Dr. Frederick E. Breithut upon conditions in the dyestuff industries in various European centers which he has visited in the course of an investigating trip lasting nearly a year, as presented to the meeting of the Synthetic Organic Chemical Manufacturers' Association at Bellport, Long Island, was on the whole most gratifying to those who have the interests of the American dyestuff industry at heart.

An abstract of Dr. Breithut's remarks is given elsewhere in this issue of The REPORTER. It is noteworthy, however, that of the newer dyestuff manufacturing nations, he found only England to be in such condition as to become a potential competitor for world markets, while in many of the larger consuming countries, particularly Russia and Poland, there is an excellent market awaiting exploitation just so soon as normal industrial and financial conditions can be restored. These countries at the moment are so thoroughly disorganized, both politically and financially, that, although there is a great need for dyestuffs, it is extremely difficult to arrange for satisfactory methods of payment. There is, moreover, a distinct distrust and dislike of Germany which would make it possible for another dyestuff producing nation to be well received providing acceptable financial arrangements could be made.

It would seem, in view of the generally chaotic conditions existing throughout Europe, that the American dyestuff industry has little to fear from foreign aggression, providing the present tariff protection is continued and all elements stand together in presenting a united front to any threatened invasion from without.

A close collaboration of the various component parts of the I. G. is the main factor in accounting for the success of the German manufacturers. The lack of such collaboration on the part of American manufacturers is one of the chief obstacles in the way of ultimate success for the American dyestuff industry.

Recent activities attributed to the I. G. in the way of effecting close working agreements with dyestuff manufacturing concerns in other countries, notably England and the United States, indicate realization on their part of the necessity of adopting a policy of "boring from within" if they are to regain any large part of their former export business in these countries. It is doubtful, however, if even the Germans could do much more than compete on an even basis with American manufacturers should they attempt the production of colors in this country. Only in the point of greater technical skill and wider experience would they have any marked advantage. They would be compelled to pay the same prices for raw materials, the same rate for labor, and would have the same high selling cost. The experience of the only foreign firms so far attempting to manufacture in America has, up to date, shown them to have little, if any, advantage over the American firms with which they compete.

If the Germans should attempt the manufacture in this country of valuable specialties not now produced here, and which are consequently on the non-competitive list, it is doubtful if there would be any advantage to them over the present method of importation. It is probably actually cheaper for a foreign manufacturer to produce abroad and pay the non-competitive duties than it would be for him to produce in this country free of duty. We are told on good authority that one of the large foreign manufacturers, who now imports a very considerable quantity of non-competitive specialties, has given the question of producing these colors in America very serious study and has come to the conclusion that there is more profit to be gained by continuing their importation.

If these specialties eventually become competitive and so are compelled to pay duty based on the American valuation, this would, of course, alter the situation to a considerable extent. Even in this eventuality, however, it is extremely doubtful if they could do much more than meet the American producer on even terms, should they attempt to manufacture here. It is a vastly more difficult proposition to operate an entirely strange plant with new and unskilled labor, different machinery and new sources of supply of raw materials than it is to continue in operation a plant which has been long and successfully operated.

All in all, it is our conviction that if American dyestuff manufacturers stand firmly together in presenting a united front to all questions involving tariff legislation; if they actively support the Appraiser's staff by rendering all technical assistance in their power, the American industry should be reasonably safe from foreign onslaughts.

The most greatly needed factors in assuring this safety are united action in the common cause, mutual confidence, interchange of technical information and the elimination of the foolish and suicidal cutthroat

competition which has been so much in evidence during the last couple of years.

By taking a leaf from the German book and putting into operation "gentlemen's agreements" of obviously mutual advantage much can be done to stabilize and improve conditions in the American industry without in any way transgressing the provisions of the Sherman law. A closer personal contact between representative factors in the American industry brought about by informal gatherings, such as the recent outing of the Synthetic Organic Chemical Manufacturers' Association, ought to prove a very helpful influence in this direction.

Germany has given us a wonderful example of what can be accomplished in the way of controlling world markets in the field of organic chemical products. If we choose to follow this example, the main elements in which are painstaking research, unified action against any common enemy and close co-operation on all internal matters, we need fear no foreign invasion of American markets and we may even eventually be able to compete advantageously in the markets of the world.

T. C.'S COLUMN

RESPECT FOR THE CHEMIST

RESPECT by the personnel of a mill for its chemist is necessary if he is to accomplish his intended purpose. Somehow respect does not just simply exist; it has to grow, on the basis of the feeling that the chemist knows his business. And the strange thing about it all is that one may acquire as much of this intangible respect from a simple trick like removing an ink spot from the manager's white shirt as from working two or three weeks overtime to save a thousand dollars for the company.

Most of our ruminations in this column about the chemists have been based on the more or less inexperienced man in a new position, and the present remarks hardly apply to well established chemists.

The writer once realizing that his own usefulness would have to depend solely on results, adopted the principle of trying to do anything that anyone in a group of mills asked for. It was only necessary to establish a system of priority. The G. M.'s work came first, the superintendents' next, then foremen and second hands, and now and then an individual like fireman, machinist, or office man. It proved possible to keep them all reasonably interested in the work of the laboratory.

It is a fact that opinion in the plant has more to do with real success than opinion in the higher places in the office. In the mill respect has to depend on results; in the office clever talk may go a long way, but it will not get far outside.

It seems that a chemist is expected to know about everything that is at all connected with chemistry. People realize that there are patent lawyers, criminal lawyers, corporation lawyers and many other kinds, besides plain ordinary lawyers, but somehow a chemist is a chemist and ought to know everything, whatever his education or experience may have been.

The chemist's own viewpoint has been well summed up: "Should you ask a chemist if aluminum will withstand the corrosive action of nitric acid his best answer may be: 'Try it and see.' This is not remarkable, and should not surprise you, as the knowledge which might enable a chemist or metallurgist to give you a more definite answer would probably only be gained through experience in the field of applied chemistry rather than from records or research.

"Also your friend, the chemist, like your doctor and lawyer, is popularly accredited with much more knowledge than any one person could possibly possess; and if he is a true scientist, he is only a trained (and very modest) seeker after truths, and has probably specialized in work which had nothing whatever to do with aluminum or nitric acid."

The outsider knows nothing about all this and merely thinks you do not know much if you start to explain; nor does your explanation carry much conviction if you do not happen to have the proper testing implements—a laboratory is a laboratory to the man in the street.

Since many of the questions asked are not very abstruse or complicated but merely require common knowledge, isn't it, in self defense, worth while to know the common ordinary, every-day things or where to find them?

Besides the usual fakes and nostrums encountered in mill work the writer has been called upon to remove all kinds of stains, to furnish material for polishing the steam engine and for case hardening, to pass on the merits of gasolines of different gravities and on extra mileage producers, to dissolve meal out of an automobile radiator, to pass on a chemical that would burn the ashes as well as the coal, analyze food for diabetics and dye about every sort of garment worn. Some of them have to be refused for fear of future complications, and it is usually wise to put the dyeing in this class.

A particular instance comes to mind where a paraffin candle had dripped on a dress. The problem of removal suggested organic solvents and other complications, but it was more easily solved, although not by a chemist. Ironing between pieces of newspaper did the trick. Chemistry? Hardly, but why use chemistry if it is not necessary, and why not know whether it is or not?

Many of these every-day items are mentioned in courses of chemistry, but many of them are soon forgotten; many others are never touched.

Perhaps there is a germ of sense in the idea that the popular respect for chemists would be increased by a (properly absorbed) course for chemists, in the Chemistry of Common Things.

T. C.

LOWELL TEXTILE SCHOOL GRADUATION

The Lowell Textile School held its twenty-sixth annual graduation exercises in Southwick Hall on Tuesday, June 10th, when forty-two students, comprising classes in textile manufacture, textile engineering, textile chemistry and design, received their diplomas. This was one of the largest classes that have graduated from the school in several years.

The exercises were introduced by the president of the school, Charles H. Eames, B.S., who presided. His address dwelt upon the importance to the textile industry of the thorough training received by the graduates, a message designed to impress upon them the scope of the work they will accomplish in the years to come. He said in part:

"The founders of this institution probably had this thought in mind when they joined hands, efforts and resources to erect these buildings, obtain this equipment and organize the instructing staff that a curriculum might be established to so separate young men and young women for the textile industry that it might receive this new life to further its progress and development. It was not simply to replace the aged and infirm as their span of life was ended, but to add the young trained mind which would be capable of grasping in short time all that has been accomplished and then to devote the rest of life to development in new fields thereby adding considerably to the sum total of the world's progress. If this equipment, plant and faculty serve only to acquaint the youth with the processes and methods of past and present, it is simply useful in filling the ranks as they become thinned. They must do more. They must serve to demonstrate the fundamental laws of nature, and show their correlation. They must stimulate vision and originality. They must show the resources and materials that are available to make the textile industry serve our people more efficiently."

The chief speaker was Harry C. Merserve, secretary of the National Association of Cotton Manufacturers. The subject of his address was "Thrift in Industry."

A particularly interesting feature of the graduation were the announcement of merit and scholarship awards and the presentation of special prizes for theses. The Saco-Lowell Shops thesis prize of $100 for the thesis of greatest value prepared in the school during the term was presented to Philip R. Lowe for his thesis, entitled "The Effect of Regain Upon the Strength and Elasticity of a Worsted Fabric." This student was also presented with a bronze medal by the National Association of Cotton Manufacturers for attaining the highest rank in cotton.

Those who graduated with the degree of Bachelor of Textile Chemistry were: Arthur Illman Anderson, Wakefield; Raymond Babigan, Lowell; Charles Edward Bachelder, Lowell; Lester Harold Bailey, Lowell; Edward Benjamin Bell, Lowell; James M. Booth, Boonton, N. J.; Wen Pei Chen, China; David Scott Clement, Providence, R. I.; Joseph Richard Donovan, Dorchester; William Ernest Durgin, Lowell; George Paul Feindel, North Wilmington; Berkeley Lewis Hathorne, Stoneham; Philip Stanley Johnson, Lynn; Everette Vernon Steele, Marblehead.

Dr. Leo H. Baekeland, president of the American Chemical Society and honory professor of chemical engineering in Columbia University, has been made Commander of the Order of Leopold by King Albert of Belgium. Among former distinctions conferred upon Dr. Baekeland, president of the General Bakelite Company, are the crosses of an officer of the Legion of Honor of France and of an officer of the Order of the Crown of Belgium.

SUMMER OUTING OF SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS' ASSN.

Dr. Breithut Discusses Foreign Conditions

All members of the Synthetic Organic Chemical Manufacturers' Association who were present at the three-day summer outing agree that it was one of the most successful and enjoyable occasions in which they have participated. As an annual event that draws together for a short period of sociable and congenial recreation most of the leading chemical and dye manufacturers in the country all acknowledge that the outing is a most effective factor in promoting that spirit of co-operation and good-fellowship in the industry which is so necessary to its progress.

Bellport, Long Island, was the spot chosen by the association for the outing and the Wyandotte Inn was the center where the members gathered to play golf, tennis and baseball and to mix sociably and without formality, during Thursday, Friday and Saturday, June 19, 20 and 21.

The leading sports event of the outing was the golf tournament played Friday afternoon. Prizes were awarded in the evening to the two winners, A. H. Pierce and B. T. Busch who led with gross scores of 72 each. Prizes for low net scores were awarded as follows: W. S. Weeks, 102-30-72; S. C. Moody, 103-28-75; S. W. Pickard, 107-30-77; K. A. Klipstein, 87-10-77. Tennis matches were played during the greater part of two days.

Dr. Charles H. Herty, president of the association, presided over the business meetings, and Harrison F. Wilmot took charge of general arrangements and was necessarily extremely active during the three days in a successful endeavor to arrange the program so that all present would have a good time.

Part of Friday afternoon was devoted to an interesting address by Judge Marion Devries, counselor to the association, who reviewed the most important tariff litigations pending in which the question of the American valuation clause is involved. He believes that this important point in effective tariff protection, about which so much unnecessary confusion seems to revolve, should remain as a basis for all future tariff systems, and that all industrial associations should unite in support of that policy.

It was indeed fortunate for those assembled at Bellport that Dr. Frederick E. Breithut, Federal Trade Commissioner, who for the past year has been touring the various industrial centers throughout Europe, arrived in New York on Thursday. Dr. Breithut, learning that the members of the association were gathered at Bellport, took the opportunity to address them on some of the most important points in connection with his valuable survey of the foreign chemical and dye situation. The purpose of his investigation was to supply the Department of Commerce with sufficient information about conditions abroad to enable it to work out a plan to develop and improve American export trade in organic chemical products.

He succeeded in giving his listeners a remarkably clear conception of the underlying industrial spirit of each country through which he had passed. By a suggestion here and a brief, colorful description there, he drew an unusually interesting picture of the big foreign chemical manufacturing centers, and brought out the essential facts of the situation in each country so distinctly that his audience received a series of accurate impressions rarely effected by an impromptu talk.

"Distrust is everywhere," he declared. In France it was difficult for him to gain the confidence of the plant executives with which he came in contact; they prevented him from securing much of the information for which he had come. But in Germany he was treated cordially by the directors of the many plants which he visited in his course through that country. The plants in Italy he described as surpassing all others in grandeur and magnitude. But the four greatest concerns turn out a quantity of dyestuffs and chemicals far in excess of the country's needs. Financial distress is the natural result and some of the makers, Dr. Breithut said, are bordering on bankruptcy. In Italy German influence is strong.

In Switzerland the chemical industry is healthy. The four large concerns are working to near capacity, but their directors complain about the loss of much valuable export trade and are unanimous in agreeing that the American tariff is extremely effective in protecting our growing dye industry.

In England the speaker found conditions much better than is generally supposed. "The British were very courteous to me and placed every facility at my disposal in order that I might gain easily the information desired," he said.

Dr. Breithut thought that a large potential export market lies in Czecho-Slovakia, as their consumption of dyes is above the average of many other countries, and that the feeling for Germany in the country can be overcome by showing the consumers how good the American products are and by assisting them to overcome local difficulties. Russia and Poland are also great potential markets for American dyes, but many political and financial obstacles must first be overcome.

He left until last a discussion of conditions in the German industry. On his trip he passed twice through Germany during the year and a half he was in Europe. Of the situation there he said:

"The first trip I found a distinct feeling of depression prevailing, but when I left the second time a few weeks ago, conditions had changed much for the better. I visited many of the great plants of the country, that is, those the German owners cared to show me, and while there was not the distrustful feeling prevailing, such as in France, they were very careful that nothing outside of general matters was disclosed. I took particular care to ask about the German-English dyestuff agreement, and was told that nothing had been signed. However, they informed me that an understanding existed and that some

fine morning it would not surprise the Germans to wake up and find that such a condition had been reached The German manufacturer realizes that his efforts to control the world's markets passed with the war. Now special attention is being given to the establishment of a chain of stores for the purpose of displaying German dyes. The idea is to call to the attention of the consumers the supposed fact that they are special colors and shades, and at the same time to bring home the idea of German-made goods. It is excellent propaganda and should be met at once by the American producer."

PONTAMINE DIAZO FAST BLUE 2RL

E. I. du Pont de Nemours & Company announce an addition to their line of diazotizable blues, Pontamine Diazo Fast Blue 2RL. This product when diazotized and developed with beta-naphthol, gives navy blues of reddish shades, possessing good fastness to washing and to light. It is suitable as a ground for blue discharge patterns where the usual direct colors are not sufficiently fast. It is very soluble, said to dye evenly, and therefore may be used on all classes of cotton goods, especially for machine dyeing. Its fastness to washing renders it particularly suitable for such materials as flannelettes and tickings, and material for workmen's clothing. It is redder than either Pontamine Diazo Blue M or Pontamine Diazo Blue BR. It may be used on pure silk; the shades obtained being very fast to washing, light and perspiration; also it is of good fastness to cross dyeing.

THE GRASSELLI DYESTUFF CORPORATION

Recent rumors of German invasion of the American dye industry, unconfirmed reports involving the alleged sale of the Grasselli Chemical Company's dyestuff plants to members of the Cartel, have been satisfactorily cleared up by a notice distributed by the Grasselli company explaining the negotiations which had resulted in such suspicions among the trade. Despite not a few implications which have recently been circulated, there is no reason whatever to believe that German financial interests exist in the new arrangement. The notice reads:

"The Grasselli Chemical Company will, beginning July 1, 1924, operate its dyestuff department through a separate company, the Grasselli Dyestuff Corporation. This new company will take over the dye manufacturing plants, dye warehouses and laboratories, dye selling agencies, etc., heretofore operated by the Grasselli Chemical Company. Arrangements have also been made whereby the Grasselli Dyestuff Corporation becomes the sole importer of the dyestuffs manufactured by Farbenfabriken vorm. Friedr. Bayer & Co., of Leverkusen, Germany.

"The officers of the new company will be G. E. Fisher, president; E. W. Furst, vice-president; R. N. Wallach, vice-president and treasurer; R. Hutz, vice-president and secretary, and these officers, together with W. T. Cashman, G. M. Eno and F. Hill, will constitute the Board of Directors. Messrs. Fisher and Furst are vice-presidents of the Grasselli Chemical Company, and Messrs. Cashman and Eno members of its Board of Directors. Messrs. Wallach and Hutz have for some years been connected with the dyestuff department of the Grasselli Chemical Company, Mr. Wallach having been general manager of that department.

"The main office of the Grasselli Dyestuff Corporation will be at 117 Hudson Street, New York City. All dyestuff branch houses and service laboratories heretofore maintained by the Dyestuff Department of the Grasselli Chemical Company will be continued by the Grasselli Dyestuff Corporation and remain in charge of the present staff."

THE PFAUDLER CO. PURCHASES ELYRIA ENAMELED PRODUCTS CO.

The Pfaudler Company, Rochester, N. Y., announces that it has purchased all of the assets of the Elyria Enameled Products Company, of Elyria, Ohio. The purchase was consummated June 3, 1924.

It is the intention of the Pfaudler Company to continue operation in the Elyria factory and to continue the production of Elyria equipment. All of the staff of the Elyria Enameled Products Company have been retained, and with bigger production made possible through the operation of both factories, even better and more complete service than heretofore will be given.

The Pfaudler Company is rapidly completing plans to place on the market a new line of glass-lined piping for the chemical and allied industries. The production of the Elyria line of glass enameled cast iron equipment will be continued.

It is also announced that the Pfaudler Company's European factory, located at Schwetzingen, Baden, Germany, is now operating at full capacity, and is in a position to give direct service to any of its clients having European interests. They will be served from this factory, thus eliminating ocean freights.

Harry S. Calvert, for so many years president and general manager of the Elyria Enameled Products Company, has been elected to the board of directors of the Pfaudler Company, and has been made vice-president in charge of the Elyria Enameled Products Division.

Frederick Trowbridge, vice-president and Western manager of American Aniline Products Company, New York, died suddenly of heart trouble, June 15th, in San Francisco, while on a business trip. Mr. Trowbridge was connected with National Aniline & Chemical Company from 1907 to 1920 as Chicago and Kansas City representative, resigning in 1920 to become sales manager of American Aniline Products Company, Chicago.

Dyestuff Tables

A List of the Principal American-Made Colors with Their Properties and Fastness Characteristics

[NOTE: The publishers of The REPORTER have secured more or less complete data in regard to many of the dyestuffs which are at the present time being manufactured in the United States. As the following material has been brought togetner from various sources, they realize that errors are quite likely to appear, and it is earnestly requested that any readers who find errors or who are able to give additional information will communicate with the publishers in order that this material may be made as correct, complete and up to date as possible. These tables will appear serially until all colors upon which we have data shall have been covered. The publication of this data was begun in the issue of March 10, 1924.]

FAST YELLOW R
(Schultz No. 149)

SPECIALLY SUITABLE FOR: Wool.

USUAL METHOD OF DYEING: Glauber salt and sulphuric acid. Rinse well after dyeing.

SHADE: Reddish yellow.

SHADE BY GASLIGHT: Little change.

SOLUBILITY: Excellent.

LEVEL: Excellent; can be used for shading at the boil.

EXHAUSTS: Well.

FASTNESS TO:
- **Acid:** Shade goes redder.
- **Alkali:** Fast.
- **Carbonizing:** Fairly fast; somewhat redder.
- **Fulling:** Not fast; bleeds into white wool.
- **Ironing:** Fast.
- **Light:** Relatively good; Fast Light Yellows are better.
- **Potting:** Not fast.
- **Steaming:** Fair fastness to dry steaming.
- **Sulphur:** Fairly fast; bleeds slightly after stoving.
- **Washing:** Not fast.

ON UNIONS: Cotton-wool dyed neutral: No interest. Cotton-wool dyed acid: The cotton is left white. Wool-silk dyed with acetic acid: The silk is left white.

ON OTHER MATERIALS: On silk: Dyed with boiled-off liquor and sulphuric in light percentage, fairly fast. On cotton: No interest.

PRINTING: Adapted for printing pieces.

DISCHARGING: Discharges white with tin crystals or zinc dust.

COMPETING PRODUCTS: Made in the United States by American Aniline Products, Inc., and E. I. du Pont de Nemours & Co.

PERMANENT RED 4B
(Schultz No. 152)

This color is used for lakes only, and precipitated with calcium salts gives bluish-red lakes similar in shade to Lithol Red R (S-173). Permanent Red 4B, however, is much faster to light than the Lithol Red R, which shows in lithographical printing. The lake formed with Permanent Red 4B is very fast to water alcohol and oil and light. It is not affected by heat. It has, however, a tendency to bronze. The color precipitated with barium salts gives a yellowish Bordeaux shade.

COMPETING PRODUCTS: Made in the United States by Cincinnati Chemical Works and G. Siegle Corporation.

PALATINE CHROME BROWN
(Schultz No. 154)

COMPOSITION: Mono azo.

SPECIALLY SUITABLE FOR: Loose wool, slubbing, yarn, piece dyes, hats, etc.

USUAL METHOD OF DYEING: Fullest shades obtained by dyeing with acetic acid and top-chroming. Large amount of chrome needed in top-chroming.

SHADE: Dull bluish shade of brown.

SHADE BY GASLIGHT: No change in shade.

SOLUBILITY: Solubility not very good.

LEVEL: Excellent.

EXHAUSTS: Does not exhaust well.

FASTNESS TO:
- **Acid:** Fast to acid.
- **Alkali:** Shade turns redder with 20 per cent ammonia.
- **Carbonizing:** Fast if the dyeing is done with sulphuric acid; otherwise not.
- **Cross-Dyeing:** Fast to acid cross-dyeing.
- **Fulling:** Fast; white wool, white cotton and white silk are not stained.
- **Ironing:** Fast.
- **Light:** Excellent; suitable for men's wear.
- **Perspiration:** Fast.
- **Potting:** Fairly fast.
- **Rubbing:** Fast if properly rinsed before and after chroming; otherwise not.
- **Scouring:** Very fast.
- **Steaming:** Fast; shade changes very slightly.
- **Street Dirt:** Fast.
- **Sulphur:** Fast.
- **Washing:** Very fast.
- **Water:** Fast; stands Markischer test. Stands Government tests quite well.

SENSITIVE TO METALS, LIME: More sensitive o chrome than S-782. The dyestuff in the bath which has not been fixed on the fiber is precipitated by chrome and renders a good washing necessary if shades fast to washing are desired.

DYED BY OTHER METHODS: Dyed on a chrome mordant, gives darker shades faster to fulling. Chromate: Does not exhaust and can only be used for light shades.

ON UNIONS: Cotton-wool: Dyed top-chrome, the cotton is stained a little; S-782 is better.

ON OTHER MATERIALS: Silk-wool: The silk is dyed about one-half as heavy as the wool.

COMPETING PRODUCTS: Made in the United States by Butterworth-Judson Corporation; Consolidated Color & Chemical Company; National Aniline & Chemical Company; United States Color & Chemical Company; American Aniline Products, Inc.; Sherwin-Williams Company; Amalgamated Dyestuff & Chemical Company.

ACID ALIZARINE GARNET R
(Schultz No. 155)

COMPOSITION: Mono azo.

SPECIALLY SUITABLE FOR: Wool.

USUAL METHOD OF DYEING: Acid and top chrome.

SHADE: Direct, a red shade of yellow. Top-chromed, somewhat yellower than Alizarine Red W.

SHADE BY GASLIGHT: Yellower.

SOLUBILITY: Good.

LEVEL: Level dyeing, excellent.

EXHAUSTS: Does not exhaust well.

FASTNESS TO:

Acid: Same as Alizarine Red W.
Alkali: Turns bluer in a 20 per cent ammonia solution.
Carbonizing: Fast.
Fulling: Fast; does not bleed into white wool or white cotton.
Ironing: Fast.
Light: Excellent; suitable for men's wear.
Perspiration: Fast.
Potting: Alizarine Red W is better.
Rubbing: Fast.
Scouring: Fast.
Steaming: Fast to moderate pressure.
Sulphur: Fast.
Washing: Very fast.
Water: Fast; stands Markischer test good.

ON OTHER MATERIALS: Cotton-effect threads are left white; silk-effect threads are stained slightly.

COMPETING PRODUCTS: Made in the United States by Butterworth-Judson Corporation; National Aniline & Chemical Company; American Aniline Products, Inc.; Amalgamated Dyestuff & Chemical Company.

PALATINE CHROME VIOLET
(Schultz No. 156)

COMPOSITION: Mono azo.

SPECIALLY SUITABLE FOR: Loose wool yarn and pieces.

USUAL METHOD OF DYEING: Chrome mordant, top chrome or chromate. Chromate, the color is weak; top chrome the best method.

SHADE: Dull reddish violet.

SHADE BY GASLIGHT: Redder.

SOLUBILITY: About 20 grains per liter.

LEVEL: Suitable for piece dyes.

EXHAUSTS: Clear.

FASTNESS TO:

Acid: Fast.
Alkali: Fast.
Carbonizing: Fast.
Fulling: Fairly fast against white wool; moderate against white cotton.
Ironing: Fast.
Light: Dyed top chrome, fast enough for men's wear.
Perspiration: Fast.
Potting: Not fast.
Rubbing: Fast.
Scouring: Fast top chrome.
Steaming: Fairly fast.
Sulphur: Fast.
Washing: Fast against white wool.

SENSITIVE TO METALS, LIME: Sensitive to iron, the shade is duller. Sensitive to copper, the shade is redder.

MACHINE DYEING: Suitable.

OTHER PROPERTIES: Mostly applied in compound shades.

DYED BY OTHER METHODS: Dyed by the silk-white process, white silk is only slightly tinted. After-treated with copper sulphate, the color gives a red shade which is not as fast to fulling and scouring as when top-chromed.

ON OTHER MATERIALS: Cotton and artificial silk threads are left white.

PRINTING: Adapted for vigoureux printing. The prints are very fast to water and fulling. The color may be printed with fluoride of chrome or with acetate of chrome.

COMPETING PRODUCTS: Made in the United States by Butterworth-Judson Corporation; E. I. du Pont de Nemours & Co.; National Aniline & Chemical Company; United States Color & Chemical Company.

DIAMOND BLACK PV
(Schultz No. 157)

COMPOSITION: Mono azo.

SPECIALLY SUITABLE FOR: Wool and slubbing, especially where the material is to be woven with white worsted, as in shepherd plaids and pin checks, etc.

USUAL METHOD OF DYEING: Glauber salt and sulphuric acid top-chromed.

SHADE: Direct is a Bordeaux; sufficiently chromed, a blue shade, bloomy black.

SHADE BY GASLIGHT: A little duller.

SOLUBILITY: Very good; does not foam.

LEVEL: Good; better than Diamond Black F (S-275).

EXHAUSTS: Not completely.

(*Continued on page* 451)

The Journal of a Hosiery Dyer

Silk-White Effects—Peroxide Bleach on Silk—On Cotton and Art Silk—Bluing a Bleached White—Dyeing Grays

By S. P. R.

Silk-White Effects

JULY 27.—In making heathers on triple-fiber goods it is not necessary to be so particular when the silk is to be cross-dyed, but sometimes the silk must be left pure white. The silk will come out white with Black BH if it is only dyed to a good navy, but if we have to use enough to make a good developed black it stains more. The stain can be kept off to some extent by the addition of some tri-phosphate of soda, but there is another condition that steps in. When we run the goods through the nitrite bath and the developer, the pure silk is acted on, even though it has no dye on it, and the result is a Bismarck Brown tint on the silk. The best remedy for this is to use only enough developer for the dye and to be careful in the washing, but if all these fail we must tint the silk with a little Patent Blue A and trust that the finishing boss can't tell the difference between a silver tone and a pure white.

Peroxide Bleach on Silk

August 2.—There's been enough trouble with peroxide bleach to make a man lose his mind, but I think we've got it fixed now. I started out with 10-volume peroxide and then switched to Albone, which is 25-volume, then to the Austrian stuff, which is 100-volume, and finally to sodium peroxide. The worst trouble we had was that the silk turned yellow after it had been bleached white, and while we were trying to get the cotton white. I have not been able to find out what causes it, and the expert from the peroxide company was no better informed than I was. Finally, I worked out a process of bleach and boil-off in one bath and it works fine. It's just a good, strong peroxide with plenty of silicate and boil-off oil run for an hour or so at a boil, then washed and blued. According to the experts I am using too much peroxide, but when I figure the cost of labor and materials I have the old way beaten by 50 per cent in addition to a great saving in time and an improved appearance in the goods.

Peroxide Bleach on Cotton and Art Silk

August 8.—The worst trouble with the chlorine gas bleach on cotton and art silk goods was the kier boil; in fact, I didn't dare use it on art silk, and if I didn't boil out the cotton tops wouldn't bleach clear. I had a bleach box made with a lead coil and a false bottom and a lattice screen to cover the goods. It would hold 500 pounds at a time. I made up the bath with peroxide, made just before use from sodium peroxide, then a large amount of silicate and sulphonated oil. We had to wet the goods out in boiling water with a little soluble oil and then put them in the bleach at 200 degrees. By doing this late in the afternoon and fastening them down with the lattice they stayed in all night and the bath was near 140 degrees the next morning. The white was equal to the gas bleach and eliminated all the labor of loading and unloading the kier and watching the goods while they were bleaching. After the box was opened in the morning we had but to wash them twice and blue them.

Blueing

August 15.—Blueing a bleached white is not as easy as it sounds, because it all depends on the kind of a white the customer wants and on the kind of goods you have to work with, to say nothing of how good a bleach you have to start with. I have settled down to three tints because no one dye will do for all cases. On cotton I use a mixture of Blue RW and Chloramine Red 8B which goes on cotton at 120 degrees and doesn't do much to the silk. On silk I use a mixture of a neutral dyeing acid blue and Acid Rhodamine which won't touch cotton or art silk, and for art silk a mixture of Methyl Violet with Rhodamine. This last one could be used on everything if customers would take the whites you made for them, instead of making you match somebody's work that wasn't as good as your own, but by using the three tints anybody can get any kind of a white that is wanted.

Grays

August 19.—Although anybody not familiar with dyeing wouldn't think so, a gray is the hardest color of the whole line to get right. That is because it is what is called a neutral tone, and the least shade one way or the other makes it look like another color. The dyer generally matches it in about the same time as anything else, but there seems to be a habit, among the dyes that make grays to turn color at some time or another and spoil the match. Practically all the direct blacks from the cheap Black E to Benzo Fast Black L have a habit of getting greener, and if you do not keep the sample a half hour before you pass the lot there is likely to be complaints later on. If you do keep the lot waiting till the sample comes back to shade, then the lot of goods makes a change on its own account. On silk goods you have to shade a blue black with red and yellow to get a gray, and then it looks green in one direction and red in the other. We need a good dye for grays, and need it quickly.

The Psychology of Color

Wave Motion—Suggestions Caused by Color—Color Characteristics

By MARTIN L. GRIFFIN

Mount Hope Finishing Company, North Dighton, Mass.

LIGHT and color are so intimately connected that we cannot discuss one independently of the other. White light, which is, of course, colorless, is the composite resultant of the seven primary colors, commonly referred to as red, orange, yellow, green, blue, indigo and violet. Ordinary colors that we see are produced by reflection or transmission. Since different substances possess different colors, they are selective in their reflection. A red or blue fabric is observed to be either red or blue because only these colors are reflected, while the complementary colors are absorbed. By this process most of the colors in nature are produced.

The same is true of colors produced by selective transmission. Thus, a piece of red glass appears red because it has sifted out all the complementary rays of white light and allowed the red light to pass freely through it. The third method by which color is produced is by interference. Since the wave length of red light is greater than that of violet, it penetrates further into the shadow than violet and produces interference. Thin films of oil on water and soap bubbles are good illustrations of color by interference.

Wave Motion

The phenomena of heat, light, color, sound, magnetism and electricity are manifestations of agitation in the ether, including the atmosphere, which we may call the limitless space beyond the earth's surface. These manifestations are the result of wave motion. A sound fundamental knowledge of the wave theory will clarify our conception and knowledge of much that we encounter in daily experience. Just as there are sound waves or vibrations both too slow and too rapid for the human ear to detect, so there are light waves extending beyond the red and the violet.

There are two fundamental characteristics of wave motion: length and frequency. Depending upon these, all phenomena in the realm of sound, light and electricity are produced, and more besides that our normal senses do not respond to. Wave length and frequency are closely related as you will observe. The longer the wave length the slower the frequency or vibration, and conversely the shorter the wave length the greater the frequency or rapidity of vibration. The violinist alters the vibration and hence the pitch of a string by shortening or lengthening it by moving his fingers over it. Thus, we may pass through the range of audibility from 32 to 32,000 vibrations per second. Beyond these limits we are not able to hear. Such sound waves travel very slowly, only 1,089 feet per second, owing to their relatively great length, and soon fade out. We may, however, transform waves of lower and higher frequencies so as to make them audible.

Suppose, now, that the number of vibrations per second is increased by millions; the wave length will be decreased by millions. The wave length of the color red is the longest of the visible colors of the spectrum and is computed to be about seven thousand millionths of a millimeter in length. Violet has the shortest wave length, equal to about four thousand millionths of a millimeter. Beyond these we have ultra-violet rays, given off by the sun, the electric arc, radium and the Crookes tube. These are the shortest waves we know anything about.

Incredible as it may seem, the phenomena impressed upon our senses of hearing and sight do partake of wave motion and are susceptible of convincing proof. But beyond these transforming limits to our sensations, who will fix the limits of frequency of the flying electrons, and what further manifestations will be revealed? Who will venture to deny that psychology is unrelated to this ultra sphere and that no reaction upon our subconsciousness is possible?

The Vestal

Once a palid vestal
  Doubted truth in blue;
Listed red as ruin
  Harried every hue.

Barricaded vision,
  Garbed herself in sighs;
Ridiculed the birth-marks
  Of the butterflies.

Dormant and disdainful,
  Never could she see
Why the golden powder
  Decorates the bee.

Why a summer pasture
  Lends itself to paint;
Why love unappareled
  Still remains a saint.

Finally she faltered;
  Saw at last forsooth,
Every gaudy color
  Is a bit of truth.

Then the gates were opened,
Miracles were seen;
That instructed damsel
Donned a gown of green.

Wore it in a churchyard,
All arrayed with care;
And a painted rainbow
Shone above her there.

This poem was composed by a young girl of ten, Nathalia Crane, of Brooklyn, and appeared recently in the literary supplement of the New York Evening Post, receiving very favorable comment by the Post's literary critic.

Of all the impressions made by the senses upon the mind, 60 per cent are made by sight, and those of color occupy a conspicuous place. The impressions created by color sensations are capable of exerting a tremendous force, and able to cause pain or pleasure in our lives. It has impressed mankind from the earliest times. Orientals have always bedecked themselves with bright colors. Joseph had a coat of many colors which was the envy of his brethren.

Suggestions Caused by Color

Among animals color plays many important parts; now it is for protection in the struggle for existence, and sometimes for attack and defense. Darwin suggests in his theory of sexual selection that the females of the animals prefer to mate with those individuals having especially bright colors. Psychologists have proven that all our expressions are the result of our intermingling associations. Color, by its association with certain events, ideas and objects, conveys other impressions. Red is commonly associated with heat and light. This connection is very old and primitive in the symbolic worship of the sun by savages; white is associated with cool serenity of the sky and sea. Gray, to most people, suggests old age. Color language has come to be to some people a matter of course, like eating and sleeping. "Say it with flowers" is now a common advertising slogan with many florists.

Has there ever lived a child who has not repeated the following old-fashioned rhyme, accenting the last word of each line?

The rose is red,
The violet blue,
The grass is green,
And I love you.

In these first three lines colors and objects are suggestively associated, and the fourth line is the psychological sequence.

Violets, buttercups, daisies, dandelions and lilacs are all suggestive of the gaiety and joy of spring-time, while the sombre browns of autumn with its fading flowers and foliage carries suggestive forebodings of approaching winter.

Nature is the great painter with colors, and if you will take note, she is more lavish with those colors which are life-giving and energizing? The foliage and grass are green, while reds, yellow and white predominate in flowers. There are very few blue and violet-covered flowers.

There is also much psychology in the sequence of colors. Contrast the dawn with its rosy tints beaming forth into the full light of day, absorbing the mists of earth and chasing the shades of night away; with the eventide, and the glory of the setting sun, lengthening the shadows and fading into night.

Thus does life follow the course of the sun to its zenith and ebbs as it recedes from us, till we reach that subconscious state nearest death. The white light of day, the composite of all the colors, arouses emotions of joy, delight and action; while the darkness of night lulls our senses into oblivious sleep. The psychology of daylight and darkness are phenomena duplicated every day when the mother puts her baby down to sleep and pretends night by darkening the room. Sometimes an eclipse of the sun, or even the rain-clouds of a thunderstorm will simulate night and birds will stop their singing and go to roost.

Color Characteristics

Deep orange is the most exciting color, followed closely by scarlet; violet and blue are the least exciting. Red is a warm and stimulating color; yellow and green are tranquilizing. Yellow is luminous and carries with it a warm brightness and is softly exhilarating. Green in proper saturation is restful, while blue and violet are cold and depressing. Thus a very careful selection of colors for the walls of a hospital is of great importance. Their effect may be either baneful or therapeutic. The same is true applied to our homes and offices where many are confined by their daily occupations.

The therapeutic value of colored rays has long been known and practiced. Wounds will heal more quickly exposed to white light. Pain has been relieved by red rays, and bacteria are killed by ultra-violet light. Light baths are frequently given for their beneficial effect.

The results of color sensations are due to the fact that we receive certain visual perceptions. "Light falling upon the retina of the eye excites certain impulses, and these passing to the optic nerves and thence to the brain, produces changes in the brain centers and thus give rise to what we call sensations." Visual experiences touch the whole personality and therefore the psychological results of color are bound to be complex.

Jean Provoust, of Roubaix, France, has arrived in this country on business connected with the dyeing and textile industries. He will spend a number of weeks in this city and Boston.

The Cause of Fuzziness in Silk Dyeing

[NOTE.—*This article was written in answer to a letter addressed to the Inquiry Department regarding the reasons why silk has a tendency to become fuzzy and form "silk lice" during dyeing operations. As it represents considerable research into raw silk production and offers a solution to the problem of such novel nature as doubtless to be of interest to the general reader, we publish it herewith in full.*]

The fact is generally known that when silk breaks down from overworking it forms a fuzz on its surface. We judge, however, that the question relates to those cases where, in spite of the greatest care and careful handling, the fabric appears to have reached its limit of endurance. It is necessary to go back to the origin of the silk itself to understand this condition.

The silk worm, when ready to spin, is equipped with two glands or sacs which contain a liquid secretion and also two very small glands whose function is in doubt. The colloidal material in the large glands does not furnish silk by simple evaporation in the air; neither does it form silk by oxidation. Were either of these conditions true there would still be no explanation of the origin of the gum which coats the spun fibers. The small glands are of insufficient size to supply enough gum to coat the silk furnished by the larger glands.

The formation of the silk fiber seems to be a biological reaction perfectly analogous to the clotting of blood. Fresh blood, drawn from an artery into a perfectly clean tube shows no tendency to clot unless mixed with a small trace of the lymph from the cells of the skin or muscles. In the same way the secretion of the small glands acts as a precipitant of the secretion of the large glands of the silk worm at the instant of spinning. The precipitation causes one element to assume a dense fibrous structure, leaving the remainder to precipitate a few seconds later, and to act as a binding material.

From this it can be readily seen that in order to have a perfect, normal silk fiber the precipitation must take place under the most favorable conditions. When the human system has a deficiency of calcium, the first symptom is an inability of the blood to clot readily (hemophilia), and it is just as reasonable to assume that the absence of one or more of the mineral ingredients, which exist in silk in almost infinitessimal amounts, exert an influence on the formation of the fiber. That mineral matters exist in silk is shown by the ash, reported by every chemical analysis, and, as promptly, ignored.

We are now able to understand how silks from different localities may differ in the degree in which the fiber itself has coalesced on account of differences in the food of the worms.

The action of boiling soap and alkalies removes not only the, gum but, to a slight extent, penetrates the fiber and, if the various fibrillae, that go to make up the single fiber, are not uniformly adherent to each other, they will be separated and at each broken end will curl up to form what is known as a silk louse.

We do not assume that a single silk fiber resembles a thread made of many fibrillae, but rather that the motion of the liquid at the time of spinning gives rise to a striated structure like that of Damascus steel. When this striated state is at its best, there is a uniformity of structure that resists breakdown, but when the individual striae are separated from each other by ever so little gum, they will readily separate during the boil-off and reveal themselves later in the dye bath.

The answer to the last part of the question as to how the troubles may be avoided may not be satisfactory to the manufacturer. We assume again that the dyer is not boiling off any more than is absolutely necessary, and that he gets the silk out of the dye bath in the shortest possible time; then if lousiness appears there is no help for it. The remedy can only be a careful investigation of the silk in its raw state.

To boil off and dye a skein will give a fair knowledge of how it will work practically, but even a simple test of this kind needs to be done with all the care of a scientific investigation, otherwise the results will mislead rather than enlighten.

Cohesion tests, boil-off and ash determinations are useful and can be combined with the practical dye test to draw a general conclusion.

Generally, the dyer is blamed for faults of this kind, and if none of the original silk is still in existence it is rather difficult for him to prove otherwise.

TRADE ITEMS

In pre-war years the American industry supplied Venezuela with her requirements of package or household dyes, while the Germans confined their attention to selling dyestuffs in larger quantities to textile mills and others using dyestuffs in manufactures. This situation, however, has changed markedly since the war, in that the German manufacturers are making strenuous efforts to secure the package dye trade as well, says a report to the Department of Commerce.

Supplement to Dye Standard List Issued

The Treasury Department has issued a supplementary list of dye standards. The list is the first of the supplements to be issued as additions to the new list, announced three weeks ago, to be used in appraising coal-tar dyes as to strength. The tariff act provides that dyes shall be assessed on the basis of strength of commercial imports prior to July 1, 1914, and those being entered in higher concentrations are compelled to pay a proportionately higher specific duty. The list issued is brief. Future additions will be promulgated as changes or revisions appear necessary.

Technical Notes from Foreign Sources

Temperature Coefficients in Cotton Dyeing

An interesting account of the effects of change in the temperature of the dye bath during the process of dyeing cotton goods with substantive dyes is contained in the Kolloid Zeitung, 1924, volume 34, pages 109 to 112. It is stated therein that the effect of variation in the temperature of the dyeing process depends on the change that is effected in the dispersed state of the dyestuff. This is due to the heating of the aqueous solution of the dye and also on the nature of the fiber which is being dyed.

The rise of the temperature is usually accompanied with an increase in the dispersion of the direct dyestuffs in an aqueous solution, and it is assumed that cotton exerts its maximum affinity for a direct dyestuff when the dispersion of the latter reaches a certain critical value. Hence the temperature coefficient of a dye is positive or negative as its dispersion in cold aqueous solution is below or above the critical value. Generally the critical dispersion value for cotton is below that for wool, so that dyestuffs, for example, Erica BN, etc., having a negative temperature coefficient for cotton, may have a positive temperature coefficient for wool.

Manufacture of H Acid

The process for the manufacture of H acid, which is described in British Patent No. 190,114, is of Italian origin. Briefly the process is as follows:

Naphthalene is sulphonated with oleum and the sulphonic acid thus obtained is nitrated with nitric acid. The solution is then completely freed from nitrogen oxides by means of a strong current of air, and sodium chloride is added to effect precipitation of the alphanitronaphthalene 3-6-8 trisulphonic acid which is made in this reaction. This precipitate is the sodium salt of the acid.

The latter is then filtered, washed with a solution of sodium chloride, dissolved in from two to five parts of water in an autoclave, and treated with hydrogen under a pressure of from four to five atmospheres at a temperature of from 60 to 70 deg. Cent. with the addition of not more than 0.5 per cent of nickel, cobalt, iron, or copper, or their oxides, which may be introduced on a carrier of broken charcoal, pumice or quartz. The materials used in the reduction must be completely free from organic compounds of halogen, selenium, sulphur and tellurium.

When no further absorption of hydrogen takes place, the catalyst is separated by filtration, and the solution is treated with caustic soda in amount corresponding to not less than one part to three parts of the water present. The alkaline solution is heated at 160 to 170 deg. Cent. for several hours, and the H acid is precipated by acidification with mineral acid after dilution and cooling.

Dye for Human and Animal Hair

A dyestuff which is soluble in cold water and which is suitable for dyeing human and animal hair is described in British Patent No. 209,937. The dyestuff is made by mixing finely powdered para phenylenediamine with a sufficient quantity of a concentrated alkali polysulphide solution to yield a stiff paste. For example, one kilogram of the powdered para phenylenediamine is mixed with 800 c.c. of a solution of 450 grams of potassium polysulphide in 2.4 liters of water. Considerable heat is evolved and the mass solidifies. The product is dissolved in water and mixed with a suitable oxidizing agent. For example, a solution suitable for dyeing American opposum and fox furs blue shades consists of 120 to 130 c.c. of a 2.3 to 3 per cent solution of the product, 300 c.c. of a 3 per cent solution of hydrogen peroxide and a liter of water. This process is assigned to the Pigmenta Gesellschaft m. b. H.

Cottonization of Flax

A process for the complete cottonization of flax is described in the Russian Journal, Ber. Poly. Iwanowo-Wosniessensk, volume 4, pages 139-155, volume 6, pages 249 to 266, and abstracted in Chemische Zentrallblat, volume 94, IV, page 891.

It is stated therein that the complete cottonization of flax is possible, and that the progress of the process can be followed in a satisfactory manner by microscopical examination. The average ash contents of flax and cottonized flax are 1.76 per cent and 0.63 per cent respectively, and the most effective bleaching agents (oxidants) are potassium permanganate, sodium persulphate, and sodium peroxide, in the order named. Water, ethyl alcohol and methyl alcohol, in the order named, are the most suitable solvents for the extraction of flax. A solution of caustic soda in alkali exerts the greatest destructive action on flax; sodium sulphide is somewhat reactive. Flax and cottonized flax yield 35.54 and 90 per cent of sugar respectively when saccharified.

Flax is more reactive than cotton toward Fehling's solution. Absorbent cotton wool may be prepared from cotton waste provided that the latter is soft. A good absorbent flax product is obtained by subjecting the flax to two successive treatments with caustic soda under a pressure not less than 16.5 kilograms, the material being afterward bleached by means of a solution of bleaching powder and soured with sulphuric acid of concentration not greater than 3 deg. Be. Nettle fibers having a cellulose content of 55.7 per cent may be cottonized by treating them successively with 10 per cent of a solution of caustic soda (1 to 15) at 100 deg. Cent. for one hour, and then in an autocalve at 140 deg. Cent. for one hour. Afterward the fibers are steeped in a solution of one per cent bleaching powder for twenty-four hours and then soured with one per cent of hydrochloric acid.

Preparation and Dyeing of Ladies' Dress Fabrics

Preparing and Adding the Soap—Cloth and Wool Scouring—Carbonizing—The Bleaching Solution—Dyeing Process—Special Colors and Recipes

By LOUIS J. MATOS

(*Copyright, 1924, by National Aniline & Chemical Company, Inc.*)

LADIES' dress fabrics are of so many varieties that it is difficult to confine one's remarks to any limited group. This article has reference to those dress fabrics that are made wholly of wool, and which are chiefly dyed mode shades.

Owing to the softness of texture required of these fabrics, wools of the better grades are made use of. For the very choicest fabrics, those wools that combine both softness and luster, the highest qualities of long-stapled stock are selected.

Wool scouring for fine worsteds requires considerable attention; the important point to observe is to keep the temperature of the scouring liquors invariably below 120 deg. Fahr. For the best results, soft water should be used; but this is more frequently a matter of mill location than otherwise. Many mills unfavorably situated as to a natural soft water supply have installed softening plants, but there are many more which, for various reasons, prefer to get along without going to such an expense. Hard water is particularly detrimental to the "handle" and "feel" of wool, and it is always the finer qualities of wool that suffer most.

As to the choice of soaps for wool scouring, soft or potash soaps are the most desirable. The use of such soaps always leaves the wool free and clean, and in the most desirable condition for the succeeding operations. Owing to the higher cost of potash soaps, however, their use is, unfortunately, very much restricted for general wool scouring, their place being taken by the less desirable hard or soda soaps, which are less costly.

Proper scouring for worsteds requires at least three bowls, passing the wool from one to the other as slowly as is consistent with complete dissolving of the suint and thorough loosening and washing away of the adhering dirt.

Preparing and Adding the Soap

For three-bowl scouring of good grades of combing wools, prepare the soap solution with 2 pounds of soap for each gallon of water; also prepare a solution of sal soda containing 120 pounds to each 100 gallons (or about 1 of soda to 7 of water by weight). These two are "stock solutions," and are made use of by the boss scourer as the condition of the wool being scoured at the time required. It is to be remembered that strength of the soap and soda liquors actually in the bowls is of less importance than the appearance of the scour liquors or of the wool at any moment during scouring. From time to time during scouring the workman must add either soap or soda, and this is done by running off the necessary quantity of stock liquors in buckets and pouring them into the bowls. The term "bucket" means the ordinary volume of 3 gallons as represented by the usual dyehouse pail, and is well understood.

The *first bowl* is charged with 75 gallons of the soap solution (equal to 150 pounds of dry soap) and about 12½ gallons of soda solution (equal to 15 pounds of sal soda), and the bowl filled to the proper working level with water. The temperature is kept close to 115 deg. Fahr. The *second bowl* is charged with 50 gallons of the soap solution, but no soda solution is added to the commencement of scouring. Later, the workman notes how the wool is being delivered from the first bowl. If it appears to come over "greasy," small quantities of soda may be added, the amount of which is governed by the condition of the wool as it enters the third or wash bowl. The temperature of the second bowl is kept about 115 deg. Fahr. The *third or wash bowl*, usually the last bowl of the train, is charged only with water heated close to the 120 deg. Fahr., but not above. The wool as delivered from this bowl should be clean; that is, free from both suint and soap. If the wool is not clean now it will undoubtedly cause uneven yarn during the spinning.

Drying and oiling of the wool follow. Here the use of easily removable picker oils becomes necessary. The use of impure and adulterated "wool oils" only complicates matters when the final cloth is being scoured just before dyeing. Olive oil, of all oils, is the best for this purpose, but its cost prevents its general employment. Olein and other oils are now used.

Cloth and Wool Scouring

In processing wool for fine worsteds it is necessary that all the machines through which the stock passes be clean. Many specks that are noticed on worsteds in the gray result from contamination with small particles or masses of dyed wool which, from previous

operations, were not completely removed from the machines before running through the new batch. This form of contamination may occur at any point from the pickers to the time the yarns are twisted, or even later. Unless the worsteds are for blacks, or to be dyed other very dark shades, the pieces should be burled in the gray.

Cloth scouring requires as much attention as wool scouring to secure good results. The object is to remove all oils from the cloth, leaving the latter absolutely clean. This means that the soaps used should be effective, and that the water should be soft.. If hard water is used, besides a certain definite loss of soap the cloth will be contaminated with insoluble lime-soaps that invariably appear later as clouds or streaks in the pieces and cannot be prevented.

Worsteds are scoured in ordinary type washing machines and washed in the same machine. As with loose wool, the temperature must be kept below 120 deg. Fahr. After scouring and rinsing, the pieces should be sent at once into the dyehouse to be dyed, and not permitted to lie around.

The best qualities of light and medium weighted worsteds are carbonized to remove any vegetable fibers that may be accidentally present. Two processes are commonly employed—one that carbonizes with a solution of chloride of aluminum at from 9 to 10 deg. Tw., the other that employs oil of vitriol standing from 5 to 9 deg. Tw., as the carbonizing agent. In either case the clean cloth is well saturated with the carbonizing solution, then squeezed and baked in a hot flue or oven. The baking operation is of some importance, the details of which are frequently overlooked, the most essential feature being to gradually raise the temperature to that point where the vegetable matter actually disintegrates, which, for aluminium chloride carbonizing, is at 300 deg. Fahr. and for oil of vitriol carbonizing is at 200 deg. Fahr. Excessive temperature or prolonged baking even at moderate temperatures alters materially the condition of the wool, frequently causing it to become brittle, with consequent loss of elastictiy. After baking, the cloth is stiffly brushed or willowed so as to remove the fragments of disintegrated fibers. The pure wool cloth is then washed with water or neutralized by passing through a bath of very weak alkali, or entered at once into the dye bath after a preliminary wetting-out.

Ladies' white worsteds of the lighter weights are much employed as mid-year fabrics, a considerable yardage being in the white. Such fabrics, as a rule, are not carbonized, but are carefully burled in the gray, scoured, bleached and perhaps tinted, or "dyed white." The most common bleach employed in mills where this particular line of white worsteds is made is sulphur. Two methods of sulphur bleaching are in current use. The older one consists of bleaching in the "sulphur house," in an atmosphere of sulphurous acid gas evolved by burning brimstone in an iron pan. The operation continues during ten to twelve hours, after which the cloth is well washed and tinted. The other process is with a solution of sodium bisulphite, acidulated with oil of vitriol. The bleaching agent is the same—sulphurous acid.

The Bleaching Solution

A stock solution to stand at 70 deg. Tw. is made by dissolving bisulphite of soda in water. A thousand gallons of such solution (38 per cent of bisulphite) will contain close to 425 pounds. One thousand gallons of bleaching solution are made by diluting 20 to 25 gallons of the above stock solution with water and acidulating with 22 to 30 pounds oil of vitriol, stirring while the latter are being added. For the best results this bleaching bath should be free from iron. The pieces are passed through this solution, rolled, and allowed to remain overnight. In the morning they are washed to get rid of the bleaching chemicals, tinted with a suitable bluing and finally rinsed. This procedure is for white goods. In some instances bleaching preparatory to dyeing is necessary on account of the light, clear shades desired.

In this connection confusion must not be made with those clean, bright, delicate tints often used in evening dress materials, and which are dyed by the process known as "pastel." This process has as its base bleached worsted fabrics that are colored in a cold water bath containing a suitable acid dyestuff and either zinc white or fine chalk. The details for this particular process are given in Dyestuffs for March, 1919.

Peroxide is used for bleaching, either as sodium peroxide or the liquid peroxide of hydrogen, the process for which is well known. Permanganate of potash is also used to some extent, but this is believed to be more extensively used in England than in this country.

After bleaching, the pieces are made ready for dyeing by giving them a short run in lukewarm water, if not wet from the previous operation, to insure that they are clean. Cloudy pieces result more frequently from failure to give the final wash in the dye kettles, and it is an error of judgment on the part of some dyers to proceed at once with high-class pieces without first ascertaining their condition by inspection.

It is usual to put the pieces into the kettle, throw the ends over the winch and sew together. During this operation water is run in and a little steam admitted at the same time. While these preliminaries are going on, the second-hand is attending to the dyes, which have been previously selected by the boss. Complete solution of the dyes is necessary, so that no undissolved particles are present to float around in the dye bath. The dye solution should always be fed to the kettle through a strainer of fine hair sieve.

(To be concluded)

INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, 90 William Street, New York City.

L. C. M.—Question: Would you kindly inform us where we can obtain a cut mark ink that is fugitive to sulphur dye. We are manufacturing jeans that are dyed khaki color.

Answer: In our opinion Soluble Prussian Blue would be suitable for this purpose, inasmuch as it would be entirely rinsed out in the dyeing operation. This product may be obtained from your regular suppliers of dyestuffs.

It is also probable, that if you would write to the Lowell Crayon Company, Lowell, Mass., asking them for a marking crayon which would saponify in the presence of sodium sulphide, they could supply a crayon which would be satisfactory for your purpose.

G. S. D.—Question: What are the reasons for silk becoming fuzzy and forming "silk lice" on the surface during dyeing and how can it be avoided?

Note: This inquiry was referred to an authority on silk dyeing and his answer, which we believe to be of such unusual interest as to deserve a place among our regular technical articles, is printed in full on page 445.

B. L. C.—Question: All the artificial silk I have been able to get dyes in two or more shades to each lot. This applies to both direct and sulphur dyes. Is there any special method of dyeing which will prevent it?

Answer: This problem has been the subject of much careful investigation, but up to the present time no dyeing method has been found which will give uniform results. As the dyer often is blamed for the appearance of the dyed material it is well to give the subject more careful consideration before drawing a hasty conclusion.

Actual unevenness of dyeing is readily recognized by the irregular clouds and streaks of dark and light color. The unevenness of which you complain is generally found to be level in units, while the units (skeins, cones, hosiery, etc.) vary from uniform light shades to uniform dark shades. Sometimes in the same skein it may be found that the shade changes abruptly from light to dark or *vice versa*. A knot will be found at the exact point where the change occurs showing that a different lot of yarn had been tied in. In hosiery, as well as woven piece goods, distinct bands may be found wherever a new cone or bobbin has been put on.

In every case of complaint the lot must be examined carefully as it is almost sure to yield evidence of this sort which will exonerate the dyer. The manufacturer of the artificial silk, whether viscose or chardonnet, understands this condition, but so far has not been able to correct it. While the theoretical fiber is pure cellulose, corresponding to bleached cotton, there inevitably forms a quantity of hydrocellulose, corresponding to mercerized cotton, which, of course, has different affinities for dyestuffs. The physical appearance of the different lots is identical, but as the conditions of manufacture vary in some slight detail from day to day, the differences show up strongly in the dyed and finished product. There is a reagent, used in microscopic work on paper fibers, consisting of iodine dissolved in zinc chloride solution which gives a stain varying in blueness from a red on pure cellulose to a deep indigo on hydrocellulose. This can be used to show the degree of mercerization of cotton, and will also show the degree of hydrolization of art silk. It might be used to advantage by the manufacturers to standardize their product.

RECENT LITERATURE

Farbstofftabellen, by Dr. Gustav Schultz. Sixth Edition. Berlin: Weidmannsche Buchhandlung, 1923.

To quote from the preface to Volume I: "The Sixth Edition of Farbstofftabellen, on account of the great increase in subject matter during the last few years, appears in two volumes, of which Volume I is essentially an improved and enlarged edition of the exhausted Fifth Edition, while Volume II contains the new dyes which have appeared in the meantime, the instructions for dyeing and printing, raw materials, 'assistants' and intermediates used in dye manufacture."

The Dye Tables in Volume I, with the exception of pages 1 to 8 and page 296, which have been slightly revised, seem to be exact duplicates of the well-known Schultz Tables as they appeared in the Fifth Edition, having been printed from the original plates. The index at the end of this volume has been greatly reduced in size and now contains only the names of dyes actually appearing in the tables. Of the large number of additional dyes which were listed in the index of the Fifth Edition but were not mentioned in the tables because of insufficient constitutional data, some have been dropped from the Sixth Edition as obsolete, and the remainder appear in alphabetical order in Section 1 of Volume II, with a brief statement of their properties and methods of application, but without reference to their chemical structure. Some attempt has been made to bring the list up to date

by adding the names of dyes which have appeared since 1914; but these additions are few, and English and American dyes are conspicuous by their absence, no reference being made to any product of the British Dyestuffs Corporation, for instance, or the Du Pont Company, the Newport Chemical Works, or the National Aniline & Chemical Company (though its predecessor, the Schoellkopf, Hartford & Hanna Company, is represented by a few pre-war types).

The chapter on "dyeing methods for the coal-tar dyes" in the fifth edition has been completely revised, and forms Section 2 of Volume II. It now embraces all the uses of coal-tar dyes, not only as applied to textiles but also in lake-making, soaps, inks, foods, medicines, etc. A complete list of the "assistants" used in dyeing and printing, alphabetically arranged, constitutes Section 3 of Volume II, which includes also a few tables of atomic weight, etc., and a brief discussion of water softening. Section 4 contains a list of all the crudes and intermediates used in dye making, and Section 5 has a bibliography of books and journals devoted to dyeing and related subjects. Only one American journal is mentioned, however. A series of "fastness tests" for wool and cotton dyeings, similar to those given in the Fifth Edition but revised and enlarged, appears in Volume I immediately preceding the tables.

The new edition is a little disappointing on account of the lack of any new data regarding the chemical constitution of the dyes, a subject which has been strongly emphasized in the earlier editions and has been regarded as the most valuable feature of the book. Also, the absence of American and British dyes is to be regretted. In other respects the latest edition is an improvement over its predecessor and shows evidence of thorough and painstaking revision, particularly in the "errors and corrections" at the end. It should be used in conjunction with the "Colour Index" recently published by the Society of Dyers and Colourists, in which will be found most of the English and American dyes not appearing in the Schultz "Tables."

WILLIAM H. CADY.

MABEY CHAIRMAN OF TRAFFIC COUNCIL

The election is announced of Harry M. Mabey, of New York City, as chairman of the Traffic Manager's Council of the Associated Industries of New York State. Mr. Mabey is general traffic manager of the Mathieson Alkali Works (Inc.), having directed their traffic department for several years, coming to them after a long experience in railroad service.

This recognition by the Associated Industries of the importance of its membership in the eastern part of the State, and the chemical industry, marks an aggressive move to protect fully the industrial welfare of the whole State—of particular importance now that a complete revision of all freight rates in the Trunk Line Territory is under way.

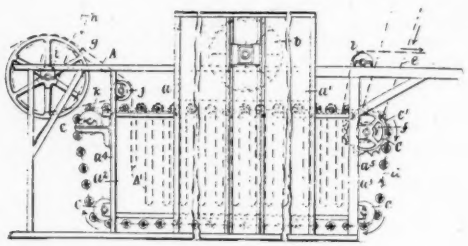
RECENT PATENTS

Drying Machine

(1,494,307; May 13)

Florent Hinnekens, Paterson, N. J., assignor to Van Vlaanderen Machine Company, Paterson, N. J.

Mechanism for forming into loops flexible material to be dried including an elongated flexible conveyor and



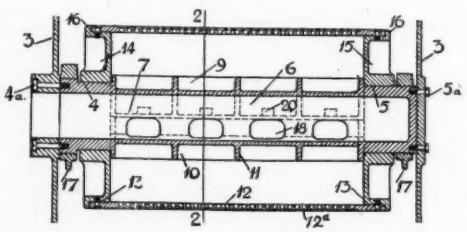
spaced supports over which it travels longitudinally and in a lateral direction, said conveyor having bearings arranged spaced from each other lengthwise thereof, substantially horizontal cross-pieces journaled each on its own axis in the bearings, and means co-operative with the cross-pieces to arrange said material thereon in loops hanging therefrom in alternation therewith, in combination with means between said supports and extending from one to the other and affording an underneath rolling contact to and support for each cross-piece.

Apparatus for the Dyeing or Analogous Treatment of Textiles

(1,495,243; May 27)

John Brandwood, Thomas Brandwood, and Joseph Brandwood, Bury, England.

Perforated cylinders and bearings therefor for use in apparatus for the treatment of textile materials contained between the bands of a double conveyor, comprising an



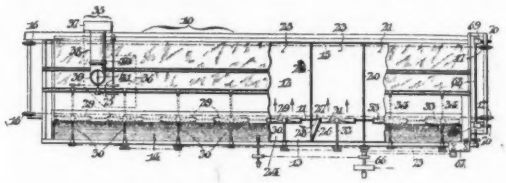
outer perforated shell, end closers for the said shell, central bearings for the said end closers upon which the latter may rotate, and a fixed central tubular shaft bearing horizontal flanges to form a partition longitudinally separating one portion of the cylinder, at any stage in its rotation, from the other portion, and means for allowing access of fluid from a fluid circulating means to one only of the said cylinder portions.

Process and Apparatus for Treating Textile Materials

(1,495,143; May 27)

Thomas Allsop and Walter W. Sibson, Philadelphia, Pa., assignors to the Philadelphia Drying Machinery Company, Philadelphia, Pa.

The process of treating material which consists in first



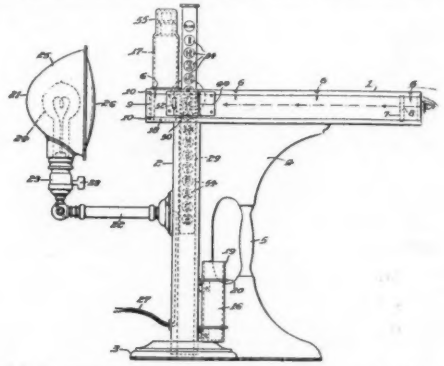
drying drying the material by heat, then lowering the temperature of said material to a predetermined degree by radiation of the absorbed heat during its passage through a cooling zone, and finally subjecting the material to the joint action of heat, warm moisture, and circulating air as a conditioning treatment.

Colorimeter

(1,495,763; May 27)

Thomas D. Simpson, Marcus Hook and A. Clayton Woodman, Merion, Pa., assignors to Sinclair Refining Company, New York, N. Y.

A colorimeter for liquids comprising an observation chamber having an "observation" end and a "light" end, two compartments at the "light" end, a bottle of a sam-



ple liquid in one of said compartments, a bottle of distilled water in the other compartment, a magazine of glass color standards, means for vertically adjusting said magazine to bring any color standard into the line of vision from the "observation" end through the distilled water to the "light" end, and means for providing another line of vision from the "observation" end through the sample liquid to the "light" end.

Although the preliminary figures of the Tariff Commission estimated the domestic dye production for 1923 at the record-breaking figure of 92,000,000 pounds, the final report shows a production of 93,500,000 pounds, or an excess of 1,500,000 pounds over the original approximation. This is nearly 50 per cent greater than the output in 1922 which hitherto held the record.

DYESTUFF TABLES

(*Continued from page* 441)

FASTNESS TO:

Acid: Fast.
Alkali: Fast.
Cross-Dyeing: Very fast.
Fulling: Very fast with white worsted; also with white cotton, mercerized cotton and silk.
Ironing: Fast.
Light: Fast enough for men's wear.
Perspiration: Fast.
Potting: Excellent; practically unequaled.
Rubbing: Same as Diamond Black F.
Scouring: Excellent; stands hot soap.
Steaming: Fast.
Sulphur: Fast.
Washing: Excellent.
Finishing: Excellent fastness.

SENSITIVE TO METALS, LIME: Very sensitive to copper and iron. For copper, use sulphocyanide of ammonia, at least 0.3 per cent in the bath.

MACHINE DYEING: Suitable.

OTHER PROPERTIES: This color equals the fastness of Alizarine Black (S-774), with regards to cross-dyeing and wet and dry finishing.

DYED BY OTHER METHODS: In dyeing it is necessary to use at least 2½ to 3 per cent of chrome in top-chroming to throw the shade over and obtain the fastness. The color will then stand the heaviest fulling against white wool, cotton or silk.

ON OTHER MATERIALS: Not adapted for dyeing pieces with white cotton listing threads, as the cotton will be stained.

COMPETING PRODUCTS: Made in the United States by Grasselli Chemical Company; National Aniline & Chemical Company; American Aniline Products, Inc.

CHROME BROWN RR

(Schultz No. 158)

COMPOSITION: Mono azo.

SPECIALLY SUITABLE FOR: Wool or chrome mordant and cotton printing.

USUAL METHOD OF DYEING: On wool with a chrome mordant; on cotton on a chrome mordant.

SHADE: Reddish brown.

SHADE BY GASLIGHT: No change.

SOLUBILITY: Good.

REMARKS: The original makers of this color, the Geigy Company, imported about 1,000 pounds of the color for use entirely in cotton discharge printing. The color is so sensitive to acids on wool that it is not recommended.

ON OTHER MATERIALS: Used in calico printing on cotton. Gives a brick shade of red which can be used for discharge printing.

COMPETING PRODUCTS: Made in the United States by the Consolidated Color & Chemical Company.

THE ACTION OF LIGHT ON DYES APPLIED TO COTTON FABRICS

(*Continued from page* 430)

Dosne[12] (1910) devised a method which also involved the use of rotating sectored disks, but which necessitated two distinct operations. The principle of the method is that the primary colors, orange, green and blue, when each occupies 120 deg. of a revolving disk, give the appearance of white or a neutral gray. As an example, to compare blue cloth before and after exposure, a sample was placed on the disk so that it occupied 60 deg. of the circle. The orange and green sectors were then adjusted so that on revolving the disk a neutral gray was produced. An outer black disk was provided on which a sector of white was placed of such a size that the gray produced on rotating the disk matched that produced by the colored sectors. In a particular case, 60 deg. of blue sample required 12 deg. of green and 80 deg. of orange to produce a gray, and this was matched on the outer disk by 32 deg. of white. After exposure it required 10 deg. of green, 70 deg. of orange and 80 deg. of white, and the increase in white—namely, 48 deg.—was taken as representing the degree of fading. Dosne admitted, however, that as the subject is theoretically complex, it is difficult to say whether such a figure as 48 deg. does or does not represent the fading of blue on exposure.

The color-patch apparatus previously mentioned may be conveniently adapted for use with three primary-color filters.

The Bawtree colorimeter[3] (1919) employs three adjustable shutters screened respectively by red, green and blue filters. The instrument is divided into two parts so that white light, the intensity of which can be controlled by a shutter fitted with a micrometer adjustment, is diffused from the test surface and illuminates one area, while the light passing the screened shutters illuminates the other area. By noting the scale reading of the three filters, a simple calculation enables the color measured to be defined in terms of hue (scarlet, green or violet), saturation and brightness.

The instrument was examined in detail by Lowry and McHatton[52] (1921), who criticized the choice of the filters. Although the blue and green filters were fairly satisfactory, the transmission of the red was too great and no filter passed yellow light of the wavelengths around 6000A (see Appendix). Bawtree[4] later overcame this defect by adding a fourth yellow filter which could be used in place of the blue one.

Trichromatic Instruments Based on Subtractive Color Principles.—The "tintometer" of Lovibond[51] (1908) employs 470 glass color filters, giving differing saturations of the subtractive primaries, crimson, yellow-green and blue. The glasses are numbered in a scale expressing "depth of color," and the gradations are so arranged that equal numbers in the three colors produce gray. Two apertures are illuminated in the instrument, one by light reflected from the test surface and the other by light reflected from a white diffusing surface and passed through the filter glasses. The resulting system of color notation is arbitrary but quite definite, while the apparatus is simple and no complex calculations are involved. Again, the filters of this instrument were criticized by Lowry and McHatton,[52] as the transmission of the red was too large.

(*To be continued*)

SKEIN SILK DYER

WANTED—A dyer to act as assistant foreman, who is experienced in skein silk dyeing; knowledge of vat dyes required. Address Box 259, American Dyestuff Reporter.

SILK PIECE GOODS DYER

WANTED—A dyer who is experienced in the dyeing of silk piece goods, including all silk, silk and wool and silk and cotton. Address Box 260, American Dyestuff Reporter.

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Married man thirty-five years of age, thoroughly familiar with the application of vat, sulphur and direct colors on cotton warps and skeins, will be open for position July 15th. Can furnish highest references and has had several years' experience as overseer in a gingham mill. Address Box 262, American Dyestuff Reporter.

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State full particulars including salary wanted. Address replies to Manufacturer and Importer, Box No. 261, American Dyestuff Reporter.

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A young man experienced in the work of matching colors in the laboratory is sought by a large concern located in a central Pennsylvania city. The candidate should possess executive ability, which will qualify him for advancement. The initial salary will be $150 a month, which amounts to considerably more in this section than in many other cities. Address replies, giving detailed qualifications and experience, to Box 263, American Dyestuff Reporter.

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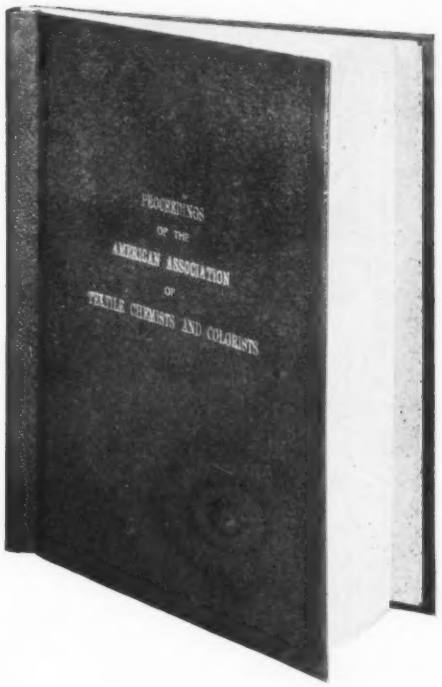

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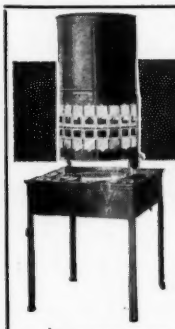
READING, PA.



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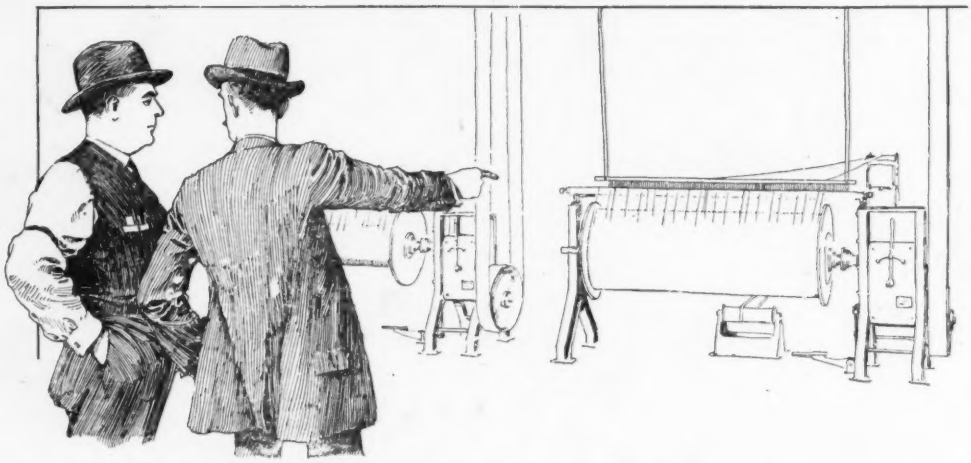

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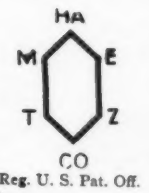

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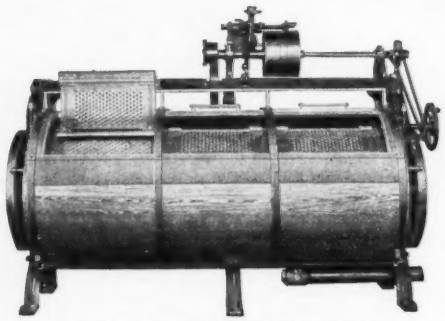

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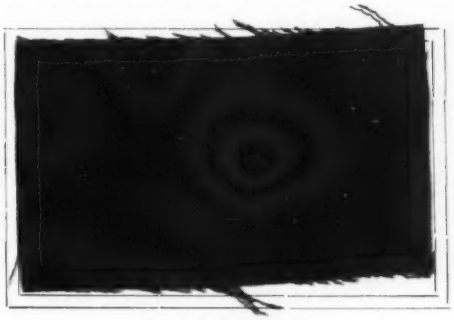

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Devoted to the practical application of dyestuffs in all industries; especially to textile chemistry—the science and practice of scouring, bleaching, dyeing and finishing.

NEW YORK, JULY 14, 1924

How the Increasing Demand for Art in Textiles Affects Color-Process Departments

Function of Color Process Departments—Changes in Manufacturing Departments—Management Systems and Flexibility in Management—Preparations to Meet Effects Upon Manufacturing Departments —Lessons from Causes of Effects Produced by New Demand

By HIBBARD S. BUSBY

A SYSTEM of control technique that is derived from a deep-seated basis of pure science, and is likewise applied so intimately to the details of manufacturing and quality as to be a major basis of reliance in matters of controversy respecting their control:

1. Is necessitated in the face of a trend of demand for the very highest and most constantly-maintained quality.

2. Is the only type of control that is consistent with rapid machinery production, high-quality market-demand and technically-sound creative art.

Of course, the cause of any general demand for superior-quality manufactured articles of adornment must be sought in factors more deeply seated than a condition of high general prosperity—there is pretty conclusive evidence that it comes as the peak of a long evolution of circumstances. One of the surest proofs of this demand is recognition of the increasing importance of the stylist as an intermediate factor between the public and the manufacturer. He is, at one and the same time, the scout who feels out demand and adapts the machinery of production to align with it, to the co-ordination and building up of a fertile market for manufacturing effort

Function of the Color Process Departments

The color-process departments, i. e., styling office, design-room, engraving, printing, dyeing, finishing and inspection sections, occupy the key position in manufacturing because it is to them that responsibility devolves to carry into effect the various interpretations of style. Upon the success of outcome of their efforts rests, largely, the ability to sell style; the efforts they make result in more than 80 per cent of the demand-basis upon which textile materials are marketed. This per cent will be increased to an even greater degree when a trend that has become more and more evident of late is felt in its full force.

Some Changes in Manufacturing Problems

Advertising and marketing, in the dry goods trade, have been playing up the factor of utility rather than price, in certain ready-to-wear articles. In a sense this tendency reflects the undue rise in the price of cotton, but it was more or less a trailing along after the inevitable reaction of the consumer to price differentials which were not consistent with those of utility and desirability, as well as being a flareback on the policy of selling extremely cheap ready-to-wear articles on the basis of cut sans quality.

Various textile materials are undoubtedly showing more and more of a tendency to settle down into better alignment with fitness-to-a-field-of-adaptability than they have at any time since machine production upset the original utility balance upon which earlier selection was based. This will be a great factor in the stabilization of demand on manufacturing, when the movement is fully established, doing much to remove what elements of being a "seasonal industry" remain in textile manufacturing. The conditions in the ready-to-wear trade (referred to above) have hastened this matter, somewhat, but it has been coming about, also, through better realization of the relation between and adaptability of certain patterns and designs to particular cloths, and undoubtedly increased (more than by any other factor) the focussing of attention upon better and more specialized modes in style.

The result has been a general leveling out of adaptability of various fabrics to their several uses—a more universal realization of the possible limits from within which creative effort may draw its materials best suitable to the various works in hand.

The *apparent* vagaries of style have a tendency to lead manufacturing policy astray from the logical course of institutional service which sounds the keynote of consistent and accelerated prosperity. Certain thorough researches into this matter of style, however, indicate that all is not style that appears to be. A great deal is a fly-by-night collection of fancies which have done much to give to style its unjustly earned characterization of fickleness. For style is a matter that our own age ought to see reduced to a science; certainly, at least, a science of very good approximation. Style of that order then becomes a thing which can be prepared for by consistent manufacturing policy and with a resultant degree of fine production in each item that will many times repay in high-class of product the effort of bringing about such a condition.

Nowhere in the whole gamut of textile design and styling is the apparent fickleness of style a more serious matter than in printing. If a large print works were to take on one-half the short-length-run print jobs offered them they would be bankrupt in a very short time, due merely to set-up and preparatory-to-running costs, or else their necessary charge per yard on such runs would reflect to eliminate the competitive element in the price of the several pieces. Leaving out the few cases where such short runs are wanted to piece out a seasonal offering, there is an enormous quantity of short pieces offered to the trade on the mistaken basis of "novelty effects the sale"—(though the cost be prohibitive!).

And yet, print patterns may be analyzed from the point of view of seasonal demand, to the elimination of many of these numbers which scarcely bear out the claim of "novelty" to a degree that it is synonymous with excellence, or even productive of a stir in the demand-trend then existent in the market. If short length prints are to be produced in great number on a "novelty" basis the roller-printing process, as carried out at present, must be left out of consideration and have substituted for it either (1) one of the lithographic (block) methods now in use, or else (2) another type of roller-printing process (a recent development) that does not require the expensive prior-process of the pantograph engraving room.

Alignment selection of print patterns to seasonal style, the choice of a line of plain colors for a given season, and the agreement upon a central motive of color around which to build the concentrated publicity efforts of an entire industry are matters the solutions of which all emanate from the same basic work. The limits of a textile group's ability to introduce or to force tendencies in these matters are gradually becoming apparent. As in the matter of the need for a centralized plan of textile research, the industry will probably have to pay the price of "experience costs" for its information simply because it has not paid the entrance fee of merely analyzing the information that would provide a sound basis for determining these matters. For the consuming public is still "like gods, knowing good from evil," and while it may be conceded, readily, that they do not, half the time, know *why* they like this or that, the fact remains that their likes and dislikes are being found by investigators to align with laws and facts which are becoming increasingly evident and of definite form.

The attitude of mind engendered by the apparent style-vagaries referred to above has resulted in a condition in the trade (respecting headliners of sales energy) that is jumpy, uncertain, and fearful of a definite stand in policy. Only when all the big factors are agreed, in council, that this or that style or color "is bound to be big this season," do the majority fall into line and push it. (We are not concerned here with the suggestion of policy in mutual organization of such matters of common interest as this, but rather to point out the effects which lack of the definite information desired has upon process departments, and to study the reaction to a more definite procedure.) Naturally procedure and attitude in manufacturing departments wait upon sales policy and the sketchy uncertainty of such a basis of selling is reflected in a manner just one degree worse in the mill.

Management Systems and Flexibility in Management

It must be admitted by the staunchest supporters of the well-known systems of scientific management that a great deal of the effort expended in applying them successfully consists in ironing out those factors within them which cause unwieldiness and slowing down of sequence of work. It is to this, and the fact that some form or other of such system is pretty much the vogue in textile mills, that there is strong reason for serious consideration of any remedy for the situation regarding decision upon style and color vogues; we know what detail of machinery their execution must encounter in present mill practice.

It is well to realize, at the very outset, that the chief contribution of the so-called "paper-systems-of-management" is investigatory. Their activities have dragged into the limelight many facts not hitherto realized and have exploded many fond (and erroneous) beliefs. But they are, at best, an intermediary stage between the "personal control" phase of business organization, and that effected by means of "centralized instrumental control." Whatever of unwieldiness is inherent to this intermediary stage has been essentially a paving of the way and securing of the detail of information (on minute data and procedure) which will be necessary in applying the ultimate type of controlled organization that works on a conning-tower basis. It has been essential to a thorough functioning and appreciation of the difficulties and problems which must beset the inauguration of this eventual type of management-control.

If our great genii, the business organizers of the nine-

teenth century, had been great inventors of *method*, as they undoubtedly were of organization, we, perhaps, need not have suffered this intermediate stage of "paper management." We are paying the inheritance tax on a partially-completed work.

This third phase, the ultimate one we foresee in our present range of machine manufacturing as established at present, is absolutely essential to high-capacity artistic development of machine production—for the simple reason that it affords the only means of keeping such production under control, while still retaining all the elements of soundly-based quality and reproduction. Huge-volume production has gotten out of the grasp of personal control, is not sufficiently encompassed through clerical systems, and demands that instrumental measurement be its mentor in order to preserve its uniformity and keep pace with accompanying developments in pure science.

The great thing, however, to be kept in mind is that anything which smoothes the path for an unhampered course of creative thought through to incorporation in high-grade product, must accomplish another step in the realization of speedy and complete flexibility of execution of whatever ingenious creations the style mentors determine to back with all the facilities of efficient production.

Preparations to Meet Effects Upon Manufacturing Departments: the Policy

As the market returns to its earlier established, logical *property-basis* of selecting fabrics it seems that it has lost none of its whims as to style-excellence in each particular fabric in general use. That complicates the problem somewhat, particularly as the indication is that general market-demand is for style-excellence *plus* all the utility-properties in each and every piece of high-priced material. Perhaps it is the economical housewife's reply to increasingly high prices (with no corresponding advancement in family budget), perhaps it is a relic of the day when hand-me-downs served in a long line of family succession. But a significant and outstanding factor in this phase of the demand is that highly artistic and beautiful fabrics lend themselves to a wide variety of adaptations in present-day modes of dress, so why throw away the piece of coat lining which, though partly worn, can be cut down and used to ornament a hat—if said lining will withstand rain.

The well-known answer of the fabric industry to this demand bears some analysis. A widely advertised educational policy of "specific fabrics for specific uses" got under way, with much attendant publicity of the technique of tests to establish the properties in each class of utility.

Still this new classification of materials has not been offset by the reasonably expected adjustments in *cost* of such special-use materials as to satisfy the trade which demanded the all-around fabric, and while there is much reason in the contention that high material and wage costs make any general system of such reduction unfeasible, it is just as certain that one of the underlying causes in the recent textile slump is failure to manufacture *up to general all-around properties* in fabrics (since the prices of these special-use materials could not be reduced to the degree their purchasers fondly hoped). It is not appropriate to this discussion to say *what degree* of price-reduction might have been effected—the contention is merely that in the face of slack demand on specials the market has seen an unusually heavy demand in top-notch fabrics of the costliest grade, whose all-around properties and range of adaptability are an established certainty.

In this phase of the situation, if we concede the necessity of increasing the general scope of desirable properties rather than the increased manufacturing of special-use ones, we are forced to place reliance upon the laboratory-mentor, not only for the verification of quality in output, but the actual addition, step by step, of the desirable properties in each item of manufacturing, which unbiased study of the field of demand will establish as existent. When, added to this, we appreciate the highly technical and complex nature of the materials from which production is drawn, the absolute dependency upon the composite laboratory as a *creative factor* in the business is at once established. Who shall say, then, that such a laboratory is not a style factor—increased properties being demanded they may, with safety, be considered "style."

Likewise, increased emphasis is thrown upon all the other creative agencies of the business in the following directly noticeable ways:

Advertising a manufacturing institution as a reliable source of high-quality goods wherever its trade name is found must carry with it an almost equally well advertised set of information as to the methods and precautions taken, through inspection and similar technique, to insure maintenance of this quality standard. An excellent example of this is found in the methods and advertising of one of the large manufacturers of artificial silk. Their copy carries a series of educational messages showing the successive steps and salient points of this quality insurance.

It is more or less inevitable that any laxity in policy of inspection should become fairly common talk in short order, more, indeed, than advertising can beat down; the policy must be right at the base, then the advertising plan has a fair field in which to work.

In the same sense, the *policy* of creative work upon which the product is based must be as sound as the advertising message—little good to flaunt a trade name with high-sounding phrases regarding its creative background unless a really artistic and technical product from its creative workers and departments is *known* to be the rule.

In all these things the burden of proof of high-class performance is thus thrown heavily upon the originating departments of production; though it take strict reorganization to bring them up to the desired stand-

ard it is the price *great* institutional business must pay for representative participation in the market upon which business is well embarked.

Contributory to the results desired from the creative departments is the background and home atmosphere behind the responsible workers in such departments. Experts on the history of art discover ample illustration from past events that only in the atmosphere steeped in beauty, and from which crudities are well eliminated, have sprung the great art-epochs and creations of the ages. Of course, this is the problem of the individual; a mere background alone will not produce artists, neither will any man surround himself with any but the objects and atmosphere expressive of his own element—the point is that more opportunity and means to acquire such a background and atmosphere must back complete realization of the kind of production field from which to derive highest inspiration. It is not so much a question of salary as it is of free option as to program, and establishment of a patronage background which will virtually grub-stake the creative man who has demonstrated latent ability. The lesson of the early European courts is well kept in mind. A price must be paid for this kind of output, and the most economical time to pay it is at the start.

Linked with the establishment of a source of good creative work must be a sound institutional policy of selling. This consideration is hard to divorce from a proper accompanying plan of paying salesmen; we wish merely to emphasize that if an institution is to develop and continue on the sound basis of art, service and high taste, it must adapt its sales policy accordingly, striving with all the resources at its command to develop and foster in the trade service, reliability, initiative, soundness and conservatism with the added touch of genius. In such a plan, high-pressure campaigns have little place—they are about as fitting as the attitude of a former ambassador to the court of St. James was expressive of the American viewpoint. We must link the sales policy to manufacturing effort *with a common ground of purpose.*

The sum of this policy is that standards of inspection, management systems and details of sales department operation must be in complete liaison to effect a united central policy which moves forward in the commercial world "from strength unto strength."

The history of great commercial movements demonstrates with complete certainty that they achieved permanency and certain fixed status only when they acceded to the policy of ultimate service. It is to be feared that the post-war maelstrom has lured some policies away from this ideal. It is too bad that the inevitable price of such wandering was exacted, but if it will serve in any way to re-establish business on the older solid foundation of consistent development, this experience cost will not have been lost. The heaviest toll has been exacted from the consequent falling down in creative ideals among craft workers—themselves the quickest to sense the change and be forced, for reasons of economic existence, to fall into line with dictated policy. This is what is back of one form of "labor trouble" that has afflicted our decade. It has been a prime factor in such troubles in textile color-process departments.

In general, color-process manufacturing departments have a reliable defense against many fundamental ills, through adherence to a sound policy of technical research and inspection that is aligned to this matter of technically-based creative art. The modern composite laboratory is handling and solving all the progressive work done, to date, in this direction. Modern trends have put such a demand for exactitude, for all-around properties, and for repetitive constancy upon textile production that the laboratory of this type stands at the parting of the ways between dull continuance in and progressive development of market. It is not only inevitable, it is also the highest kind of textile opportunity.

Some Lessons from the Causes of the Effects Produced by the New Demand

The demand in fabrics for such properties as mentioned above has done a great deal to strengthen the hold which laboratory control of manufacturing activities has upon the industry. Due to more and more reliance upon the standardization and creative side of such laboratory work so many of the difficulties and annoyances of this new phase of business have been turned to the laboratory for attention and solution that its activities have come to be accepted as one of the regular going assets of a specialized business. In this way the laboratory is truly a "production department" furnishing an output of service adding directly to real sale-enhancement, prestige and value.

Probably the chief service it renders to modern business, however, is in the tie-up of the standards of product inspection with recognized standard constants of measurement evaluation. The importance of this in the matter of taking advantage of every important new development in pure science that has a bearing on textile manufacturing can hardly be overestimated. Developments in pure science crowd so swiftly upon one another to-day that it is extremely difficult to keep pace even with the review of them, and much of the real work of putting them to practical use outbalances, in amount of energy expended, that of the actual evolution in the theoretical laboratory itself. The most annoying feature in the translation of the results of pure science laboratory work to utilization in practical manufacturing is the discrepancy existing between methods, constants, nomenclature and procedure of measurement used in the pure science laboratory and in manufacturing parlance. It is far more than a matter of names and measurement methods; actual conversions which involve serious errors must be made,

in most cases, lest the results of the pure science laboratory be thwarted and come to naught in the mill. This fact demonstrates the vital importance of founding technically-based art and its accompanying inspection practice upon a rigid system of physical chemical measurement, as commonly used among scientists, and the accumulation of mill conditions data *in terms of these same constants.*

A well-known example of an early error in conclusions resultant from failure to use a common basis of procedure was the confusion engendered in the measurement of sheen on a paper or textile surface. Originally believed measurable by one type of reading, it was not until the real character of specular and diffuse reflection and texture-pattern-effects were understood, in detail, that the full story was available, correction made of errors in former conclusions, and a method established for differentiating, with one measurement, between various degrees of inherent surface sheen.

A second phase of development contributed by the new technique to high-grade manufacturing is the binding closer of all functions of the business into one central purpose and effort. One means of accomplishing this highly desirable result has been the closer personal relation effected among the executive force by the constant contacts and united efforts for the solution of current problems and special achievements which called for centralized co-ordinated effort *in terms of a common technique.* It has been effective in the same way the required use of Latin services have been contributory to Catholic unity and solidarity. (We are relearning an ancient lesson.) The functionaries in great corporations cannot expect general personal contact with their chief executives at all times, but through a closely interwoven technique, objective procedure and language, a high percentage of the effect that was formerly obtained through personal executive contact is known to have been realized in many cases. It provides, further, extreme flexibility in the management function, for while the general manager cannot personally direct thousands of workers, he can, definitely and personally, control policy of a sub-management staff that is *trained to think in terms of a common technique,* and they, in turn, can control matters all down the line.

Perhaps the greatest contribution of the new quality demand is the elimination of a great bulk of controversy (by provision for its solution in technical control), with the consequent great opportunity in time which this releases for additional accomplishment. Reliance upon scientific measurement and the inflexible dictum of adequate control machinery convinces the skeptic or eliminates the stiff-necked, whether he be in the ranks or the post of authority.

So eloquent an appeal to sound logic (and hopeful of even greater accomplishments than the great strides already made in industry) have been the procedure and principles developed through the application of such technique as we have described in these papers that it is not surprising that this new phase of industrial development has inspired the method and paved the way for the co-operative movement by which the government is striving to give assistance to industry, aided by the vast resources of statistical and technical

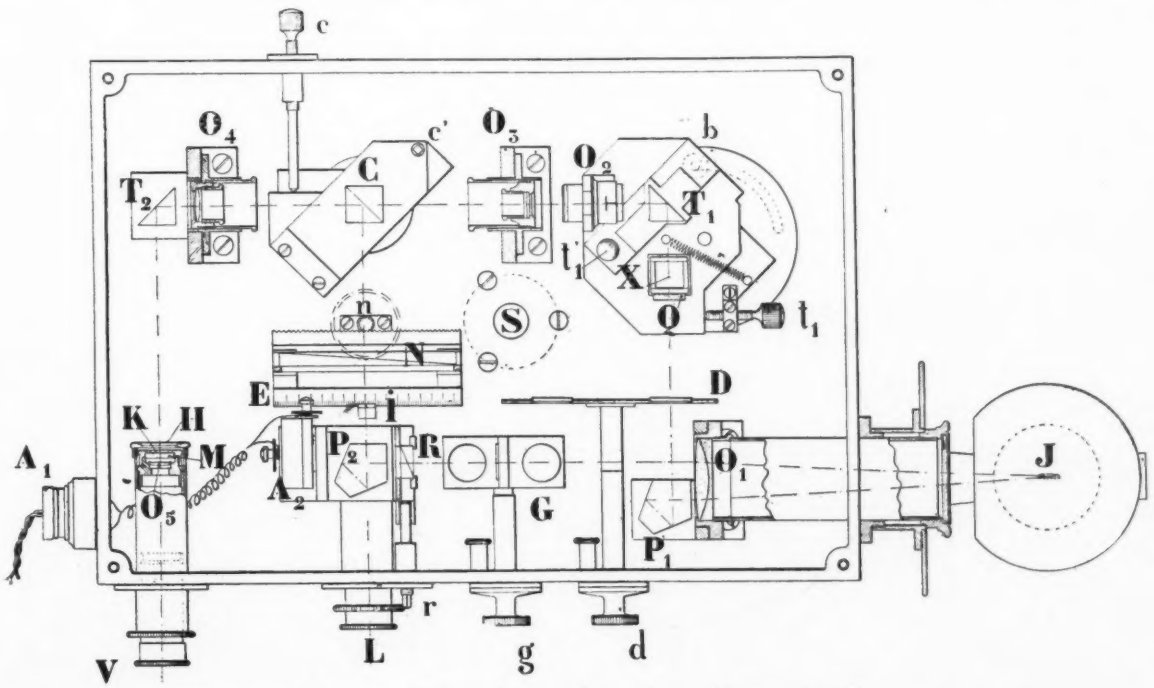
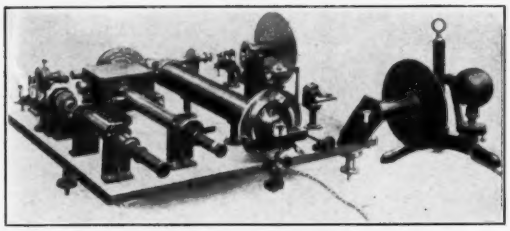


Diagram of Yvon Spectrophotometer. (See page 458).

assistance which it directs. It is a very gratifying thing to those sincere workers who had the vision, paid the price of service, and kept clean its standards and ideals, to see its policy fostered by the weight of governmental sanction and organization less than ten years from the day in which the idea had its first industrial tryout.

On the following pages are illustrated and briefly described some of the instruments which have assisted in the establishment of technical control over textile-color operations:

Yvon Spectrophotometer



Perspective of Yvon Spectrophotometer

A diagrammatic (see page 457) and perspective view are shown of this apparatus which is a remarkably general utility instrument for various measurements in the control and research laboratory.

Among its various applications of value to a textile-dystuff laboratory are the following:

For making the curves of diffuse spectral reflections from a colored surface.

Curves and spectral transmission and absorption (from a solution).

Measurement of the absolute reflection value and transmission value (from surfaces and through solutions).

Polarimetric measurements.

Three-dimension measurement of color.

As a spectrometer, for the examination and comparison of the spectra of various solutions.

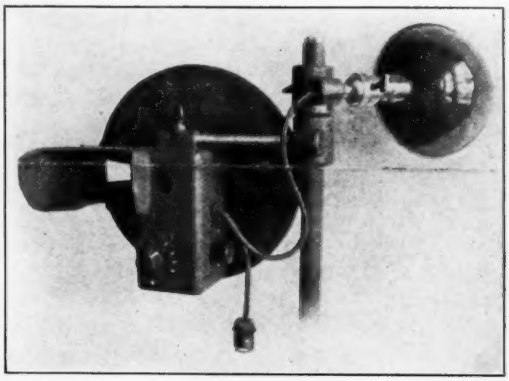
Operating upon the basic principle of a constant deviation spectroscope the principles involved in its application mark a distinct advancement in apparatus for general industrial laboratory determinations.

The Rotostat

This is an instrument for the observation, in an apparent stationary condition, of rapidly moving objects.

Its particular application to this quality-control-technique is that it permits of study of fluctuations in color, quality and form of textile materials on rapidly-moving machines, such as printing, dyeing, finishing and washing machines.

Its readily portable feature makes it equally adaptable to mill process or to laboratory adaptations.



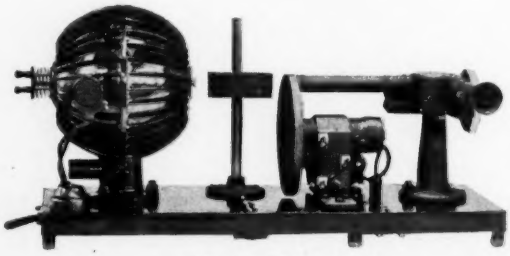
The Rotostat

The Glarimeter

Diagram and illustration of an instrument for measurement of the degree of surface finish of a material.

The Glarimeter

Its range of usefulness extends over a wide range of light to dark and is useful also in the comparison of similar effects upon various textures.



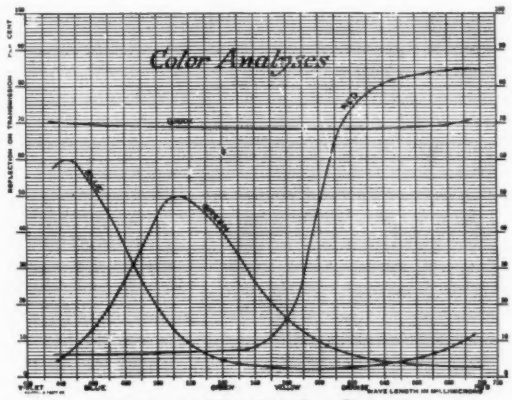
Color Analyzer

Color Analyzer

A combination spectrophotometer and color-analyzer, adaptable also to the comparison of various degrees of surface reflection.

It is a self-contained equipment, carrying on one base, the analyzing element, photometer, sample (opaque surface and liquid) holder, light source and control mechanism.

Diagram accompanying the picture illustrates the type of analysis made with it.

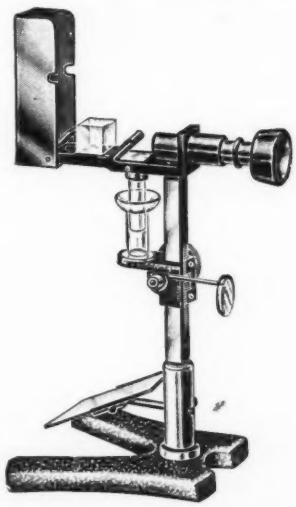


Spectral Distribution Curves

Chart Made with Color Analyzer

Bock-Benedict Colorimeter

A very convenient instrument for rapid comparison of *process* and trial solutions to standardized ones. It is also somewhat adaptable, with slight alteration, to the examination of colored surfaces.



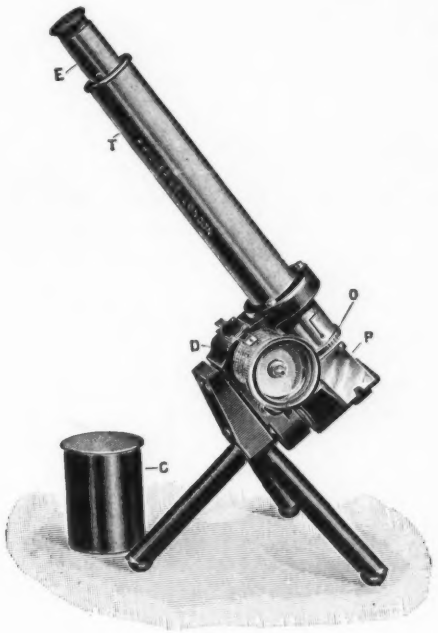
Bock-Benedict Colorimeter

Its portability and general ruggedness make it a very useful instrument for intermediate-stage quality inspection work in the various process departments.

New Model Spectrometer

One of the greatest needs of the industrial laboratory, for a long period, has been a spectrometer that, while combining the usual accepted qualities of adaptability, flexibility and a good degree of precision, should still be of sufficiently simplified construction as to enable its sale at a much lower price than placed on the more ornate and permanently located structures used in university and other theoretical laboratories.

This condition is met very satisfactorily in the instrument pictured; the value of such an instrument as a corrective and general investigatory apparatus in colorimetry and general color laboratory research is unquestioned.



New Model Spectrometer

A new booklet, "How to Route Freight to and from Inland Points in the United Kingdom," recently issued by the Cunard Steamship Company, gives data that may be of use to exporters of dyestuffs. Its contents includes cities in England, Ireland, Scotland and Wales having population over 10,000; counties in England, Ireland, Scotland and Wales; population of the United Kingdom; cities in England, Ireland, Scotland and Wales having population over 100,000; map of British Isles; Metropolitan boroughs of London; population of Greater London; Port of London Authority docks; Southampton to London service; distances, in miles, by rail between points in England, Scotland and Wales.

Copies of this booklet will be sent free upon request to the Cunard Steamship Company, Ltd.

The Action of Light on Dyes Applied to Cotton Fabrics*

A Summary of the Literature

Part II

Sources of Light—Measurement of Light Intensity—A Substitute for Light—Influence of Atmosphere on Fading—Influence of Color of Light on Fading—Influence of Temperature on Fading—Influence of Added Substances—Protection of Fabrics from Fading

By PERCY WALMSLEY CUNLIFFE, Ph.D., A.I.C.

The British Cotton Industry Research Association

BUSBY'S METHOD.—Busby[8a] (1922) has suggested a short method of obtaining the fastness of a dye when applied to a fabric from a study of the dye solution. The fastness of a dye solution to a standardized daylight lamp (*vide infra*) is first determined, several values of dye concentration being used. The light tranmission of each solution is measured spectrophotometrically before and after exposure in order to obtain the color change. This fastness is known as the "absolute fastness" and is to be correlated with the greater one of the dye on the fabric when it is applied at certain concentrations related to those of the dye solution. In future work, when comparing the fastness of dyes or determining the "absolute" fastness of a dye, it would be necessary to consider the dye solution only, Busby has recently discussed the principles underlying the method[8b] (1923).

Sources of Light

The earlier investigators and some of the more recent ones have carried out their tests in sunlight. The "actinic" value of sunlight varies from day to day, however, so that in order to obtain an exact relationship between the intensity of light and the degree of fading, it would be necessary to determine the average intensity of the solar radiation during different seasons of the year and in different climates,[59] but no records of such experiments have been found. As a prolonged period of exposure is necessary to cause the fading of most dyed fabrics in sunlight, a number of intense artificial sources of light have been employed. Among these the mercury vapor arc lamp[15, 17, 18, 28, 29, 35, 74, 78], the Nernst lamp[46] and the carbon arc[18, 28, 59, 62] have been much used but there is little evidence that precautions have been taken to maintain the samples at a humidity comparable with that of the climate for which the goods are intended. It has been shown by Harrison[35] (1912) that the fading produced by a mercury lamp of great intensity is not always the same as when a smaller intensity is used, while Walther[78] (1906), Scheurer[68] (1910) and others[35, 72, 74] have demonstrated that the results given by the mercury lamp are not at all comparable with those found in sunlight. While agreeing with this latter statement in general, Straub[75] (1916) concluded that reliable results could be obtained with gray-green colors, an exposure of twenty-four hours to the mercury lamp being found equivalent to three weeks of sunlight.

Flynn[17] (1923) considered that a sheet of crown glass 1.25 mm. thick (a microscopic slide) placed between the mercury arc and the samples, so modified the radiation that results strictly comparable with the effect of sunlight (between the hours of 9 a. m. and 3 p. m. on clear days) were produced. [See also Scheurer[68] (1910).]

Mott[59] (1915) states that similar results are produced by an arc lamp when using "white flame" carbons and a current of 28 amperes at 63 volts, the usual glass globe being discarded. With this source at a distance of 10 inches, an exposure of ten to twenty hours was found to be equivalent to fifty hours of June sunlight. "Violet flame" carbons were used by Gordon[28] (1921) and these find employment in the American "Fade-ometer," which consists of an automatically-regulated carbon arc placed in a glass globe, round which a framework is arranged to carry a large number of sample holders. One hour of this source is stated to be equivalent to 1.3 hours of standard summer sunlight.

It appears to be rational that the radiation of the carbon arc, which gives a continuous spectrum, can be modified to resemble sunlight, but scarcely so with the mercury arc, as its radiation gives a line spectrum, and many wave-lengths which occur in sunlight are absent in this artificial source.

Gebhard[18] (1910) considered that any source used in the investigation of fading must not only be rich in light in the "bright part" of the spectrum, but must also have a high emission in the violet and ultra-violet. The employment of two lamps simultaneously was recommended,[10] an ordinary arc yielding light of long wavelength and a mercury arc the ultra-violet. This suggestion was criticised by Harrison[36] (1911), who considered

*Published in the Journal of the Textile Institute. Figures refer to Bibliography to follow concluding instalment.

that in practice difficulties would arise, since it would be difficult to determine what length of exposure to each lamp would be equivalent to a given exposure to sunlight, and, further, it would be almost impossible to decide with which color this relationship should be found. Busby[8a] (1922) recommended the use of a daylight lamp such as is used in dyehouse matching. The lamp was to be standardized once for each place where the light resistance of a dye was required, a procedure which would involve measurements of the solar radiation as outlined above.

Measurement of Light Intensity (Actinometers)

Various types of actinometer have been used in order to give a numerical value to the light intensity. The quantitative photo-chemical decomposition of aqueous solutions was employed by Scheurer and Brylinski[67] (1898) and by Bechtel[5] (1909), while a vaporization actinometer was utilized by Dosne[12] (1900). By means of standardized test papers, Krais[44] (1911) was able to represent the light intensity in terms of "bleach-hours," at the same time showing that this unit was not identical with "sun-hours." All these methods are subject to the criticism that they disregard the particular wave-length or wave-lengths which cause the fading, and an actinometer may be sensitive to a ray which has little or no action on many dyes. It is also common knowledge that the color and composition of sunlight vary considerably.[20]

A Substitute for Light

Bancroft[2] (1912) has suggested that as most dyes fade by oxidation (*vide infra*), a solution of hydrogen peroxide or of a persulphate could be used as a rapid qualitative test. He considered from preliminary experiments that it might be possible to work out the conditions under which such a test should be applied, but in a particular experiment the order of fading of six dyes was other than that found in sunlight.

Influence of the Atmosphere on Fading

As early as 1837, Chevreul[9] discovered that when colors were exposed to light in a vacuum they were almost or entirely unaffected, and this result has been supported by many subsequent workers[1, 6, 7, 18, 38, 59], although the part played by the air is still controversial.

Joffre[38] (1889) observed that while the influence of a nitrogen atmosphere was generally similar to that of a vacuum, nevertheless a few dyes faded in the absence of air, and he inferred that oxygen was not always necessary for the production of fading. Bolis[6] (1908) and Gebhard[18] (1910) maintained that when fading took place in a vacuum it was due to incomplete exhaustion. Harrison[35] (1912) exposed test pieces in evacuated sealed quartz tubes to the mercury arc, and concluded that the air played little or no part in the fading produced by this source on the direct cotton colors tested, but oxygen was necessary for the fading of many basic colors. However, he adds: "Oxygen may take some part in the fading of some direct colors." In sunlight, direct colors faded slowly or remained unaffected in the absence of air; Harrison's explanation of this difference is given later.

Brownlie[7] (1903) has demonstrated that an atmosphere of oxygen (compare[48]) or of nitrous oxide induces much greater fading than one of air, while the gases hydrogen, carbon dioxide [compare Oglobin[60] (1895)], sulphur dioxide and coal gas prevent fading. The conclusion was therefore drawn that the presence of oxygen was a necessary condition for the destructive action of light.

Several workers[6, 18, 60, 68] have shown that a moist atmosphere acts as a positive catalyst in the fading of dyed fabrics, Gebhard[18] (1910) having declared that moist oxygen was the greatest factor in the case of fabrics which receive daily use or exposure, and recommended that valuable fabrics such as museum specimens should be preserved in evacuated vessels. Brownlie[7] (1902) thought that the degree of fading was directly proportional to the moisture content of the atmosphere, but water vapor alone without oxygen has been observed to cause no fading.[18] Gordon[28] (1921) found that many colors faded more rapidly in the damp climate of New Jersey than in dry Arizona.

Lazareff[47, 48, 49] (1912, 1921) investigated the effect of oxygen pressure on the rate of fading of Methylene Blue dissolved in a gelatine emulsion, and found a direct proportionality between the two for pressures up to a few atmospheres; whereas at higher pressures the rate of fading tended to reach a certain limit and become independent of the pressure.

An acidic atmosphere, such as is found in towns, as also naphtha and chloroform vapors, was stated by Brownlie[7] (1902) to retard the fading action, but an alkaline atmosphere, as found in country districts, likewise traces of ammonia, alcohol and of pyridine vapor, was considered to exert an accelerating influence. Harrison[35] (1912), however, showed that the influence of acid or alkali depended on the dyestuff employed. The following order of diminishing fading was given by Gebhard[18]: Alkaline atmosphere; moist air; acidic atmosphere; dry air; vacuum; or vacuum and moisture. He therefore declared that a pure atmosphere was essential for obtaining consistent results of exposure tests.

Influence of Color of Light on Fading

In 1885 Depierre and Clouet[11] made what appears to be the first attempt to investigate the action of different spectral colors on dyed fabrics. They exposed seventy-six dyeings under colored glasses, but as they did not determine the transmission of the latter it is

certain that they were dealing with spectral regions and not with monochromatic light. The following table was given:

Color of Dyeing	Color of Light Causing Greatest Fading
Red	Yellow
Orange	Blue
Yellow and green	Blue
Blue	Yellow
Violet	Blue

In general, they found the following decreasing order of destructive action for sunlight: White, blue, yellow, green, orange, violet and red, after which came white electric light.

Colored glasses were also used in a similar manner by Dufton[14] (1894), Oglobin[60] (1895) and Gros[30] (1901). Dufton concluded that fading was due only to the rays which were absorbed and each color was most affected by those rays for which it had the strongest absorption. The color of these rays was shown by Oglobin and Gros to be complementary to that of the dyed fabric.

More nearly monochromatic light was employed by Bolis[6] (1908), who resolved sunlight by means of a prism, the dyed samples being then placed in the resulting spectrum, kept in a fixed position by rotation of the prism. Only blacks were studied, for which the conclusions were drawn that violet and blue had the strongest action, yellow and green medium action, and red the weakest action. Tabulated results of Oxydiamine Black N and A, Diphenyd Black RO and Aniline Black were given.

Relation Between Active Rays and Absorption Spectra of Dyestuff

As some colors which are fast to sunlight fade on exposure to the ultra-violet light of a quartz mercury lamp, Sisley, Rivat and Bardet[74] (1919) stated that such colors must possess strong absorption bands in the ultra-violet, but colors which are fast in both sunlight and the ultra-violet must be transparent to a certain extent to the latter rays. This was confirmed in the case of eleven dyes in aqueous solution by a complete spectographic study, the conclusion being drawn that those colors which were fast to sunlight but not to ultra-violet had, in general, strong absorption bands between 2000A and 3200A, while those fast to both kinds of light were transparent throughout the ultra-violet (3600A-2400A). Although these results are for solutions of dyes, it appears possible that they would be generally valid for dyed fabrics.

Influence of Temperature on Fading

Mott[59] (1915) states that, in common with the greater number of photochemical reactions, the temperature coefficient (that is, the ratio of rate of reaction at one temperature to that at 10 deg. lower) of the fading of dyes is small. Schwezoff[71] (1910) investigated the effect of temperature on the rate of bleaching of dyed collodion sheets and found that between the approximate limits of 18 and 90 deg. Cent. the temperature coefficient for visible radiation was only 1.036 to 1.084.

The Influence of Added Substances and the Protection of Fabrics from Fading

It is well known that the fastness of a given dye is governed to a more or less considerable extent by the mordant employed and by such substances as are used in finishing. Investigators have therefore been induced to seek for chemical compounds which diminish the rate of fading when mixed with the dyestuff or applied to the dyed fabric.

Sales.—Possibly one of the earliest known protectors was copper sulphate, and its usefulness has been so demonstrated that Scheurer[69] in 1891, after using thickened solutions of ammoniacal cupric hydroxide, declared that its action was general for all colors, although this statement appears to be too sweeping in the light of subsequent work.[21, 76, 83]

Teichner[76] (1907) stated that Cassella & Co. applied for a patent covering the use of copper sulphate. Cupric hydroxide was precipitated from a solution of copper sulphate by means of sodium hydroxide solution, the precipitate made into a paste with glycerol, and the mixture heated with sodium hydroxide solution. This alkaline solution could be added directly to the color used. Gebhard[23] (1914) believed that the nature of both the metal and of the acid radicle was of consequence, as was shown by his observation that with Dianil Pure Blue dyeings copper chlorate increased the fastness more than copper bromide, nitrate, chloride or sulphate. Krais[45] (1902) found that other salts, such as sodium thiosulphate, nickel sulphate and cobalt sulphate, when impregnated in the cotton fabric in the cold, have a favorable influence on the fastness of a series of direct colors. The colored copper, nickel and cobalt sulphates affected the shade to some extent, but the nearly colorless molecular mixture of nickel and cobalt sulphates, as also sodium thiosulphate, had no influence in this respect. Some of the colors protected were all Diamine and Benzo Blues, Benzo and Diamine Green, and Violet and Benzoazurine. On the other hand, none of the yellows tried was influenced at all, nor were the fugitive basic dyes. As the salts mentioned are completely removed on washing with water, their use is limited to such articles as upholstery and curtain materials. In a further paper Gebhard[21] (1914) stated that copper salts, the sodium salts of most hydroxy-acids, zinc chloride and the sulphates of cerium, iron and aluminium act as protectors. By these means Dianil Pure Blue PH, Brilliant Benzo Violet B, Dianil Green G,

Malachite Green, Rhodamine O and Fuchsine O were rendered more resistant. Rhodamine S, 3B, 6G, G and O, and Fuchsine O and others were improved in fastness in the presence of sodium citrate and tartrate, while Rhodamine O, Victoria Blue B and R, Malachite Green and others were improved by sodium metaphosphate and glucose. Other salts which have been used with finishes are calcium citrate[22] and sodium chloride.[70]

In a few cases, especially with vat colors, after-treatment with sodium nitrite was observed[23] to improve the fastness, but as tendering of the cotton took place the process was considered of no practical value. The action was specific, for while Helindone Scarlet S, Yellow 3GN and Red B were improved, Helindone Orange R was unaffected. Helindone Green was improved by treatment with a mixture of nickel sulphate, ammonia and sodium nitrite, but no improvement was found with the first two substances alone.

The use of zinc "polyglucosate" has been the subject of a German patent[84] (1901). The dyed or printed goods are padded with a dilute solution of the salt and subsequently dried, or it may be incorporated in the finishing materials, while in certain cases the preparation may be added to the printing color. The production of zinc polyglucosate from liquid potato starch, glucose, zinc chloride and sodium hydroxide had previously been patented.[85]

Haller[33] (1922) has investigated the effect of the reagents used in Indigo vats on the fastness of Indigo Blues dyed in these vats, the baths being made up with hydrosulphite—sodium hydroxide; zinc dust—lime; zinc dust—bisulphite—sodium hydroxide; zinc dust—sodium bisulphite—lime; ferrous sulphate—sodium hydroxide; and ferrous sulphate—lime. Employing Ostwald's system[61] (compare[58, 82]) of color expression, he found that in all casts light caused, in addition to fading, a displacement of the color toward the green portion of the color circle, this effect being the greatest with the vat employing zinc, intermediate with the hydrosulphite bath, and least with the ferrous sulphate vat. The ferrous sulphate-sodium hydroxide vat produced the fastest dyeings, the hydrosulphite almost as good, while the zinc vat dyeings were the least satisfactory. With regard to the brightness of the shade, the zinc-lime bath yielded the brightest and the ferrous sulphate baths the dullest dyeings.

(To be concluded)

Preparation and Dyeing of Ladies' Dress Fabrics*

Part II

Colors and Recipes for the Production of Special Shades

By LOUIS J. MATOS

THE choice of dyes should be limited to the least number necessary to produce the desired shade. Only in rare instances, should complicated dye formulas be adopted. Of course, where the quality of the stock in the pieces is occasionally changed, the dyer is at a loss how to proceed, and consequently must "feel his way" toward his match by making cautious additions. In shading, as is usual toward the end of a run, it is frequently necessary to add "just a touch" of some one dye to swing the shade to the match. It is therefore desirable that the dyer have on hand a sufficient number of different dyes that will serve for all shading purposes.

Special Colors and Recipes

The following list of level dyeing acid colors is representative of those most commonly employed for this purpose. This list includes types that will enable the worsted dyer to produce practically every shade called for by the season's shade card: Wool Yellow Extra Conc., Wool Orange 2G Crystals, Fast Crimson GR, Fast Crimson 6BL, Fast Fuchsine 6B, Wool Violet 4BN, Alizarine Sapphire FS, Acid Fast Violet BG, Brilliant Scarlet 3R.

In dyeing worsted dress fabrics with the general run of dyes, it is immaterial whether the oil of vitriol is added to the bath with the Glauber salt and before the solution of dye is poured in, or afterward. It is, however, good practice to pour in some of the diluted acid slowly after each addition of dissolved dye, keeping the cloth always in constant motion, and the bath close to a simmer. Violently boiling the bath serves no useful purpose.

The following recipes are for 100-pound lots of cloth, the amounts of dyes and chemicals for which are indicated in pounds and ounces:

Light Brown.—Wool Yellow Extra Conc., 10⅜ ounces; Fast Crimson 6BL, 4 3/16 ounces; Alizarine Sapphire FS, 1 5/16 ounces; Glauber Salt Crystals, 10 pounds; Oil of Vitriol, 1 pound.

Dark Sage.—Alizarine Sapphire FS, 7½ ounces; Wool Orange 2G Crystals, 3 11/16 ounces; Wool Yellow Extra Conc., 13/16 ounce; Glauber Salt Crystals, 10 pounds; Oil of Vitriol, 1 pound.

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Lavender.—Fast Fuchsine 6B, 1¼ ounces; Wool Violet 4BN, 15/16 ounce; Glauber Salt Crystals, 10 pounds; Oil of Vitriol, ½ pound.

Tan.—Wool Orange 2G Crystals, 2 9/16 ounces; Alizarine Sapphire FS, 11/16 ounce; Fast Crimson 6BL, 3/16 ounce; Glauber Salt Crystals, 10 pounds; Oil of Vitriol, ½ pound.

Light Grayish-Brown.—Wool Orange 2G Crystals, 3½ ounces; Alizarine Sapphire FS, 2¼ ounces; Fast Crimson GR, 11/16 ounce; Glauber Salt Crystals, 10 pounds; Oil of Vitriol, 1 pound.

Light Green.—Alizarine Sapphire FS, 4 ounces; Wool Yellow Extra Conc., 3⅜ ounces; Wool Orange 2G Crystals, 15/16 ounce; Glauber Salt Crystals, 10 pounds; Oil of Vitriol, 1 pound.

Yellow.—Wool Yellow Extra Conc., 4 ounces; Alizarine Sapphire FS, 3/16 ounce; Glauber Salt Crystals, 10 pounds; Oil of Vitriol, 1 pound.

Light Blue.—Alizarine Sapphire FS, 2 9/16 ounces; Acid Fast Violet BG, 1⅛ ounces; Fast Crimson GR, 3/16 ounce; Glauber Salt Crystals, 10 pounds; Oil of Vitriol, 1 pound.

Salmon.—Brilliant Scarlet 3R, 2¼ ounces; Wool Yellow Extra Conc., ⅛ ounce; Glauber Salt Crystals, 10 pounds; Oil of Vitriol, ½ pound.

Gray.—Alizarine Sapphire, 5⅝ ounces; Wool Orange 2G Crystals, 1⅝ ounces; Fast Crimson 6BL, ½ ounce; Glauber Salt Crystals, 10 pounds; Oil of Vitriol, 1 pound.

Wine.—Fast Crimson GR 1 pound, 8 5/16 ounces; Wool Orange 2G Crystals, 5⅛ ounces; Alizarine Sapphire FS, 2 9/16 ounces; Glauber Salt Crystals, 10 pounds; Oil of Vitriol, 1½ pounds.

Medium Blue.—Alizarine Sapphire FS, 3 pounds, 9⅝ ounces; Wool Orange 2G Crystals, 6 7/16 ounces; Glauber Salt Crystals, 10 pounds; Oil of Vitriol, 2 pounds.

For all-wool worsteds, acid dyes are used exclusively; with a suitable selection, a skilled dyer is enabled to match practically every shade that is brought to him. Unlike the dyer of cotton-and-wool mixtures, the worsted dyer is not particularly concerned regarding the exhaustion of his baths, since he knows that by continuing the boiling, exhaustion will take care of itself. What he is concerned about, however, is the rate at which each component dye leaves the bath, for it is a custom observed by many dyers to stop the dyeing the moment the shade is obtained. His selection of dyes, therefore, should include those that exhaust from the dye bath at about the same rate. The exhaustion of the dye bath is important. In dyeing with a three-part mix, where the proportions, for example, are A50:B35:C15, dye B could, to advantage, exhaust somewhat slower than dye A, while dye C could, to advantage, exhaust less rapidly than either dyes A or B. The reason for this choice is obvious. As the dyes go on the cloth, the shade developed at the commencement of boiling, should be a tint of the final shade, without any preponderance of any one color showing.

Manufacturers of Dyestuffs and Intermediates During the World War

By JAMES A. BRANEGAN

THE following is a list of intermediate and dyestuff manufacturers compiled from the files of James A. Branegan, president of the Kali Manufacturing Company of Philadelphia, Pa., and formerly Chemical Director for the Alien Property Custodian. This list was compiled by Mr. Branegan from 1914 until 1919, or until the end of the war. From 1914 to 1917 new dyestuff manufacturers started almost weekly, the peak in numbers being reached during the summer of 1917. About this time, however, the larger concerns making their own intermediates had increased production and reduced their costs to a point which gradually forced small concerns to close.

The chief interest of these lists lies in the evidence which they afford of the very high rate of mortality which has prevailed in the dyestuff manufacturing industry. Comparatively few of the concerns which flourished during the war period are still active producers. The process of elimination, based upon the survival of the fittest, still continues, though with materially abated vigor.

DYESTUFFS

American Aniline Products Inc., New York, N. Y.
Atteaux & Co., Inc., F. E., Boston, Mass.
Atlas Color Company, Brooklyn, N. Y.
Atlantic Dyestuff Company, Boston, Mass.
Althouse Chemical Company, Reading, Pa.
Arnold & Marshall Chemical Company, South Seekonk, Mass.
Aniline Company, of Newark, The, Newark Transfer, N. J.
American Xylite Company, Irvington, N. J.
American Synthetic Dyes Company, Newark, N. J.
American Synthetic Color Company, Stamford, Conn.
American Color Manufacturing Company, Passaic, N. J.
American Dye Company, Chicago, Ill.
American Chemical & Dyestuff Company, Boston, Mass.
American Aniline Company, Billerica, Mass.
Alaska Chemical Company, Jersey City, N. J.
Ault & Wiborg Company, Cincinnati, Ohio.
Bancroft & Sons, Jos., Wilmington, Del.
Beaver Manufacturing Company, Andover, Mass.
Beckers Aniline & Chemical Co., Wm., Brooklyn, N. Y.
Bayer Company, New York, N. Y.
Bloch Chemical Company, New York, N. Y.
Butler Chemical Company, Butler, N. J.
Bredt & Co., F., New York, N. Y.

Bothamley Chemical, Color & Extract Co., New York, N. Y.
Bloomfield Aniline Dye Mfg. Co., Bloomfield, N. J.
Berkeley Chemical Works, Brooklyn, N. Y.
Beaverkill Dye Works, Inc., Cook's Falls, N. Y.
Cheney Brothers, South Manchester, Conn.
Campbell & Co., John, New York, N. Y.
Continental Chemical Co., St. Louis, Mo.
Calco Company, Bound Brook, N. J.
Chemical Company of America, Springfield, N. J.
Central Dyestuff & Chemical Company, Newark, N. J.
Consolidated Color & Chemical Company, Newark, N. J.
Catalytic Chemical Company, West Berkeley, Cal.
Cosmic Aniline Works, New York, N. Y.
Chrome Color Works, Mattawan, N. J.
Central Color Company, Delawanna, N. J.
Cassella Color Company, New York, N. Y.
Cylic Chemical Company, Belleville, N. J.
Connecticut Color Company, Danielson, Conn.
Connecticut Metal & Chemical Company, New Britain, Conn.
Camden Chemical Company, New York, N. Y.
Chemical Manufacturing Company, Inc., New York, N. Y.
Capitol Chemical Company, New York, N. Y.
Dexter Elliott Dyestuff Company, Putnam, Conn.
Du Pont Dyestuff & Chemical Company, Wilmington, Del.
Du Pont Chemical Works, New York, N. Y.
Drug & Dyestuff Corp., 120 Broadway, New York, N. Y.
Dick Chemical Company, E. R., New York, N. Y.
Dye Products Company, of U. S., Manuyunk, Pa.
Dye Products & Chemical Company, Newark, N. J.
Eagle Products Company, Verona, N. J.
Eagle Chemical Company, Verona, N. J.
Forbes Litho. Mfg. Company, Boston, Mass.
Fulmer & Apeldorn, Philadelphia, Pa.
Franco & Swiss Dyes, Inc., The, Richmond, Va.
Federal Dyestuff Chemical Corp., Kingston, Tenn.
Garfield Aniline Works, Garfield, N. J.
Green Company, Erik H., North Attleboro, Mass.
Hydrocarbon Chemical Company, Lancaster, Pa.
Heller & Merz Company, Newark, N. J.
Holland Aniline Company, Chicago, Ill.
Hord Color Products Company, Sandusky, Ohio.
Hub Dyestuff & Chemical Company, South Boston, Mass.
Hemingway, Frank L., Inc., New York, N. Y.
Herman & Herman, Inc., New York, N. Y.
Heath & Milligan Mfg. Co., Chicago, Ill.
Haack & Co., Newark, N. Y.
Imperial Color Works, Glen Falls, N. Y.
International Color & Chemical Co., Detroit, Mich.
Iridescent Dyestuff & Chemical Co., Brooklyn, N. Y.
International Dye Co., The, Milwaukee, Wis.
Independent Chemical Company, New York, N. Y.
Jacksonville Chemical Mfg. Company, Jacksonville, Fla.
J. Y. J. Corporation, Baltimore, Md.
Kali Manufacturing Company, Philadelphia, Pa.
Klipstein, E. C. & Sons Co., South Charleston, W. Va.
Kurz Chemical Laboratories, C. A., Dayton, Ohio.
Keystone Dyestuff & Chemical Company, Newark, N. J.
Loraine Chemical Company, Newark, N. J.
McLaughlin, Gormly Chemical Company, Minneapolis, Minn.
Marden, Orth & Hastings Co., New York, N. Y.
May, Frank L., Perth Amboy, N. J.
Mott Haven Color Works, New York, N. Y.
Metz & Co., H. A., New York, N. Y.
Melrose Chemical Company, Melrose, Mass.
Massachusetts Cotton Mills, Lowell, Mass.
Marks, Eli, Dye Manufacturing Co., New York, N. Y.
Meth-O-Lene Company, Tatamy, Pa.
Mutual Dye & Chemical Works, Bronx, New York, N. Y.
Morrill, Geo. H. Co., Norwood, Conn.
Monroe Color & Chemical Company, Quincy, Ill.
Middlesex Chemical Company, The, Chester, Conn.
Meyer Company, John H., New York, N. Y.
National Aniline & Chemical Company, New York, N. Y.
Neidrich Process Company, Bound Brook, N. J.
Newport Hydrocarbon Co., Milwaukee, Wis.
Neponset Color Company, Boston, Mass.
National Dye Corp., The, New York, N. Y.
Oakes Manufacturing Company, Long Island City, N. Y.
Organic Products Corp., Schenectady, N. Y.
Phoenix Knitting Works, Milwaukee, Wis.
Philadelphia Aniline & Extract Company, Philadelphia, Pa.
Pennsylvania Color Manufacturing Co., Philadelphia, Pa.
Pierce Chemical Company, Cardington, Pa.
Philadelphia Textile Chemical Company, Philadelphia, Pa.
Runge Synthetic Dye Company, Astoria, N. Y.
Reliance Manufacturing Company, Brooklyn, N. Y.
Reading Dye & Chemical Company, Reading, Pa.
Standard Aniline Products Company, Wappingers Falls, N. Y.
Schoelkoff Aniline & Chemical Company, Buffalo, N. Y.
Stillwell Chemical Company, The, Irvington, N. J.
Siegel Company, George, Rosebank, S. I., N. Y.
Synthetic Products Company, Inc., Tonawanda, N. Y.
Synthetic Chemical Company, New York, N. Y.
Superior Chemical Company, Brooklyn, N. Y.
Sterling Color Company, Bound Brook, N. J.
Standard Essence Company, Maywood, N. J.
Standard Aniline Color Works, Brooklyn, N. Y.
Southern Dyestuff & Chemical Company, Atlanta, Ga.
Shreve, R. Norris, Jersey City, N. J.
Smith Color Company, Wauregan, Conn.
Trico Chemical Company, Buffalo, N. Y.
T. M. T. Chemical Company, East St. Louis, Ill.
Taubel, Wm. F., Riverside, N. J.
United Piece Dye Works, Lodi, N. J.
U. S. Finishing Company, Providence, R. I.
U. S. Coal Tar Products Co., Long Island City, N. Y.
U. S. Aniline & Chemical Co., The, St. Louis, Mo.
United Dyes Corporation, Perth Amboy, N. J.
Verona Chemical Company, North Newark, N. J.
Williams & Crowell Chemical Co., Danielson, Conn.
Wyoming Dyestuff & Chemical Company, Scranton, Pa.
Windsor Print Works, North Adams, Mass.
White, John J., Inc., New Brunswick, N. J.
Wolf & Co., J., Passaic, N. J.
West Coast Chemical Company, Seattle, Wash.
Wright Chemical Corp., New York, N. Y.
Worthern & Aldrich Company, Delawanna, N. J.
Woods Sons Company, Henry, Wellesley, Mass.
Westover Chemical Company, Inc., Pennington, N. J.
Weidman Silk Dyeing Company, Paterson, N. J.
Waldrich Bleachery, Delawanna, N. J.
Willey Paint & Color Co., C. A., Long Island City, N. Y.
Zobel Company, Ernst, Brooklyn, N. Y.

Intermediates

American Aniline Products, Inc., New York, N. Y.
Althouse Chemical Company, Reading, Pa.
Ault & Wiborg Company, Cincinnati, Ohio.
Barrett Manufacturing Company, Philadelphia, Pa.
Benzol Products Company, Philadelphia, Pa.
Baker & Adamson Chemical Company, Easton, Pa.
Beckers Aniline & Chemical Company, Brooklyn, N. Y.
Bayer Company, New York, N. Y.
Butterworth-Judson Company, Newark, N. J.
Calco Company, Bound Brook, N. J.
Chemical Company of America, Springfield, N. J.
Central Dyestuff & Chemical Company, Newark, N. J.

Consolidated Color & Chemical Company, Newark, N. J.
Du Pont Dyestuff & Chemical Company, Wilmington, Del.
Dow Chemical Company, Midland, Mich.
Edison, T. A., Orange, N. J.
General Chemical Company, New York, N. Y.
Hooker Electrolyte Company, Niagara Falls, N. Y.
Heller & Merz Company, Newark, N. J.
Heyden Chemical Company, Garfield, N. J.
Holland Aniline Company, Chicago, Ill.
Marden, Orth & Hastings Company, New York, N. Y.
Merrimac Chemical Company, Boston, Mass.
May, Frank L., Perth Amboy, N. J.
Monsanto Chemical Company, St. Louis, Mo.
Montcalm Chemical Works, Indianapolis, Ind.
Melville-Corbett Company, St. Marys, Pa.
Merck & Co., Rahway, N. J.
National Aniline & Chemical Company, New York, N. Y.
Neidrich Process Company, Bound Brook, N. J.
Nitrated Chemicals Company, Kingston, N. Y.
Naugatuck Chemical Company, Naugatuck, Conn.
Newport Hydrocarbon Company, Milwaukee, Wis.
Perth Amboy Chemical Company, Perth Amboy, N. J.
Po Ambo Chemical Company, Perth Amboy, N. J.
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Stillwell Chemical Company, Irvington, N. J.
Solvay Process Company, Syracuse, N. Y.
White Tar Company, The, New York, N. Y.
White, John J., Inc., New Brunswick N. J.
Zobel Company, Ernst, Brooklyn, N. Y.

Foreign Dyes Imported Through the Port of New York During June

Compiled by the Chemical Division of the Bureau of Foreign and Domestic Commerce in Collaboration with the Chemical Division of the United States Tariff Commission

KEY TO ABBREVIATIONS FOR FOREIGN MANUFACTURERS

1—The Six Leading German Companies

A—Actien-Gesellschaft fur Anilin-Fabrikation, Berlin. Founded 1873. Branches in France and Russia.
B—Badische Anilin-und Soda-Fabrik, Ludwigshafen on the Rhine. Founded 1865. Branches in France and Russia.
By—Farbenfabriken vorm. Friedr. Bayer & Co., Leverkusen on the Rhine. Founded 1862. Branches in France and Russia.
C—Leopold Cassella & Co., Frankfort on the Main. Founded 1870. Branches in France and Russia.
K—Kalle & Co., A. G., Biebrich on the Rhine. Founded 1870. Branches in Russia.
M—Farbwerke vorm. Meister Lucius & Bruning, Hochst on the Main. Founded 1862. Branches in France and Russia.

2—The Seven Smaller German Companies

BK—Leipziger Anilinfabrik Beyer & Kegel, Furstenberg near Leipzig. Founded 1882.
GG—Chemikalienwerk Greishem G.m.b.H., Griesheim on the Main. Founded 1881.
CJ—Carl Jager G.m.b.H., Anilinfarbenfabrik, Dusseldorf. Founded 1823.
GrE—Chemische Fabrik Griesheim-Electron, Offenbach on the Main. Founded 1842.
L—Farbwerk Muhlheim vorm. A. Leonhardt & Co., Muhlheim on the Main. Founded 1879. Branch in France.
tM—Chemische Fabriken vorm. Weiler ter Meer, Uerdingen on the Rhine. Founded 1877.
WD—Wulfing, Dahl & Co., A. G. Barmen. Founded 1842.

3—Dutch, Belgian and French Companies

FA—Farbwerk Ammersfoort, Ammersfoort, Netherlands. Founded 1888.
NF—Niederlandische Farbe-und Chemikalienfabrik Delft, Netherlands (Delft). Founded 1897. Branch in Russia.
LG—Lazard Godchaux, of Brussels. (These products are probably compounded largely from the dyes made by A. Wiescher & Co., of Haeren, Belgium.)
P—Societe Anonyme des Matieres colorantes et produits chimiques St. Denis (formerly A. Poirrier), St. Denis, near Paris, France. Founded 1830.

4—Swiss Companies (all at Basel)

DH—Farbwerke vorm. L. Durand, Huguenin & Co. Founded 1871. Branches in Germany and France.
G—Anilinfarben-und Extract-Fabriken vorm. Joh. Rud. Geigy. Founded 1764. Branches in France, Germany and Russia.
I—Geselfschaft fur chemische Industrie. Founded 1885. Branch in France.
S—Chemische Fabrik vorm. Sandoz & Co. Founded 1887.

5—English Companies

BAC—The British Alizarin Co., Ltd. Established 1882.
ClCo—The Clayton Aniline Co., Ltd., Clayton, near Manchester Founded 1876.
CR—Clauss & Co. (formerly Clauss & Ree), Clayton, near Manchester. Founded 1890.
CV—Colne Vale Chemical Co., Milnsbridge, near Huddersfield.
RHS—Read Holliday & Sons, Ltd., Huddersfield. Founded 1820. (Purchases by British Dyes, Ltd.)
BD—British Dyes, Ltd Founded 1915.
Lev—Levinstein, Ltd., Crumpsall Vale, near Manchester. Founded 1864.
O—Importations of unknown source, through dealers in colors.
Lo—Charles Lowe & Co., Manchester.
Br—Brotherton & Co., Ltd., Mersey Chemical Works.

THE imports of coal-tar dyes for June, 1924, through the port of New York totaled 147,380 pounds, with an invoice value of $151,331. In addition, imports reported through other ports were as follows: Providence, 3,644 pounds, with a value of $3,327; Philadelphia, 1,500 pounds, with a value of $1,680, and Boston, 495 pounds, with a value of $519.

Imports of Dyes Through the Port of New York, 1924

Month	Pounds	Value
January	288,743	$232,571
February	158,874	176,657
March	293,862	302,016
April	174,880	182,253
May	167,245	165,521
June	147,380	151,331

Five Leading Dyes, by Quantity, Imported

	Pounds
January—	
Indanthrene Blue RS	15,090
Helindone Pink R	11,500
Indanthrene Golden Orange R	10,791
Ciba Bordeaux B	9,792
Chlorantine Fast Brown	8,488
February—	
Algol Brown B	20,497
Erioglaucine	12,213

Indanthrene Golden Orange R	6,960
Algol Brown G	6,679
Phosphine	6,522
March—	
Fast Green	16,720
Algol Blue 3G	15,139
Indanthrene Golden Orange G	13,195
Indanthrene Golden Orange R	12,696
Indanthrene Blue GCD	9,666
April—	
Algol Brown R	18,702
Fast Green	7,059
Algol Blue 3G	5,804
Alizarine Blue Black	5,673
Palatine Black	5,000
May—	
Indanthrene Blue BCS	10,030
Chlorantine Fast Blue 2GL	9,021
Cross-Dye Green B	6,727
Indanthrene Golden Orange G	6,311
Polar Red G	5,441
June—	
Trisulphon Brown	9,832
Ciba Violet B	9,259
Alizarine Blue Black	7,951
Indanthrene Golden Orange R	7,422
Indanthrene Golden Orange G	6,990

Per Cent of Quantity by Countries of Shipment, 1924

	Jan.	Feb.	Mar.	Apr.	May	June
Germany	41	44	63	49	32	49
Switzerland	32	35	15	23	32	39
Italy	6	8	6	13	11	4
Belgium	8	4	3	..	..	1
England	5	3	6	6	8	2
Holland	..	..	4	3	5	3
Canada	3	1	..	..	..	..
France	3	2	2	5	8	1
All others	2	3	1	1	4	1

Imports of Medicinals, Intermediates, Photographic Developers and Other Coal-Tar Chemicals

The poundages given are approximate, because a small quantity of the medicinals were reported in ampoules, the exact weight of which is not known.

Month	Pounds	Value
January	201,271	$48,116
February	55,094	16,870
March	212,343	46,254
April	21,550	22,789
May	17,534	7,001
June	106,127	22,669

Imports of Color Lakes

Month	Pounds	Value
January	....	....
February	4,181	$1,848
March	11,520	3,343
April	2,956	2,143
May	3,421	1,034
June	330	463

The dyes in this report are grouped by Schultz numbers, and in the case of those which mould not be identified by Schultz number the classification according to the ordinary method of application was adopted. As the pastes and powders of the vat dyes vary widely in strength and quantity, each vat dye has been reduced—in nearly every case—to a single-strength basis.

The designation of "†" for competitive and "*" for non-competitive indicates the appraisement basis for the assessment of the ad valorem duty in paragraph 28 of the Tariff Act of 1922. Those dyes without designation are doubtful, pending further investigation.

The ad valorem rate for competitive dyes is based on the American selling price as defined in subdivision (f) of section 402 of Title IV; the ad valorem rate for non-competitive dyes is based on the United States value as defined in subdivision (d) of section 402 of Title IV of the Tariff Act of 1922.

Dyes of Coal-Tar Origin

This table includes imports through the port of New York to the amount of 147,380 pounds, and also 3,644 pounds from Providence, 1,500 pounds from Philadelphia and 495 pounds from Boston.

Schult: No.	Name of Dye and Manufacturer	Quantity (pounds)
28	Hansa Yellow G	250
	Hansa Yellow G Powder—(M)	
58	Alizarine Yellow R	500
	Ultra Orange R—(S)	
88	Acid Anthracene Brown	441
	Acid Anthracene Brown PG—(By)	
139	Orange IV	10
	New Yellow Extra Conc.—(By)	
177	Mordant Yellow	200
	Milling Yellow O—(M)	
227	Brilliant Croceine	100
	Brilliant Croceine 3BX Extra—(K)	
296	Cotton Yellow	1,244
	†Benzo Fast Yellow RL—(B)	
	Benzo Fast Yellow 4GL—(By)	
	Benzo Fast Yellow RL—(By)	
319	Diamine Scarlet	50
	Diamine Brilliant Bordeaux R—(C)	
326	Oxydiamine Violet	1
	Oxydiamine Violet BF—(C)	
339	Brilliant Orange G	500
	Diamine Orange B—(C)	
354	Direct Gray R	1,455
	Direct Gray R Paste—(G)	

Schultz No.	Name of Dye and Manufacturer	Quantity (pounds)
424	Chicago Blue 6B	10
	Dianil Pure Blue PH—(M)	
435	Janus Brown	50
	Janus Brown B—(M)	
449	Trisulphon Brown	9,832
	*Trisulphon Brown B Conc.—(S)	
494	Auramine G	226
	Auramine G—(By)	
	Auramine G—(I)	
496	Setoglaucine	1,102
	*Setoglaucine 753—(G)	
503	Neptune Green	441
	†Erioviridine B Supra—(G)	
507	Xylene Blue VS	1,984
	†Xylene Blue VS Conc.—(S)	
509	Chrome Green	20
	Chrome Green BD Extra—(By)	
	Chrome Green GD Extra—(By)	
512	Magenta	100
	†Magenta AB Powder—(B)	
516	Crystal Violet	922
	Crystal Violet Extra Powder—(B)	
	Crystal Violet P—(By)	
539	Soluble Blue	50
	Cotton Blue No. 2 Conc.—(M)	
541	Brilliant Dianil Blue 6G	220
	Direct Brilliant Blue 8B—(I)	
543	Patent Blue	3,967
	*Kiton Pure Blue V—(I)	
545	Patent Blue A	250
	†Poseidon Blue BXX—(B)	
551	Eriochrome Azurol B	2,756
	Eriochrome Azurol BX Conc.—(G)	
571	Rhodamine 6G	464
	Rhodamine 6G Extra—(I)	
	*Rhodamine 6GDN Extra—(Q)	
573	Rhodamine B	750
	†Rhodamine B Extra—(B)	
	Rhodamine B Extra—(M)	
608	Euchrysine	334
	†Patent Phosphine GRNTN—(B)	
622	Delphine Blue B—(Q)	110
627	Anthracyanine	771
	*Chromacetine Blue S—(DH)	
	Chromacetine Blue S Extra—(DH)	
663	New Methylene Blue	500
	*New Methylene Blue NSS—(C)	
681	New Fast Gray	220
	Malta Gray J—(P)	
687	Rosolane O, T, R	10
	Rosolane O—(M)	
748	Hydron Blue	11
	†Hydron Blue G Paste—(By)	
759	Anthraflavone G (sgle. stngth.)	352
	*Anthraflavone GC Powder—(B)	

Schultz No.	Name of Dye and Manufacturer	Quantity (pounds)
760	Indan. Golden Orange G (sgle. stngth.)	7,541
	Helindone Golden Orange IG Dbl. Pst.—(M)	
	Vat Golden Orange G Dbl. Pst.—(B)	
	Vat Golden Orange Powder—(B)	
761	Indan. Golden Orange R (sgle. stngth.)	9,052
	Indan. Golden Orange RRT Pst.—(B)	
	*Vat Golden Orange RRT Paste—(B)	
	Vat Orange RRT Paste—(B)	
762	Indan. Scarlet G (sgle. stngth.)	400
	Vat Orange 4R Powder—(B)	
767	Indan. Violet RR (sgle. stngth.)	419
	Vat Brilliant Violet RR Paste—(B)	
774	Alizarine Black	500
	Alizarine Black WR Powder—(B)	
779	Alizarine Orange (sgle. stngth.)	1,814
	Alizarine Orange R Powder—(By)	
	Alizarine Orange RP Paste—(By)	
780	Alizarine Red	497
	Alizarine Red S Powder—(By)	
782	Alizarine Brown	4,958
	Anthracene Brown RD Paste—(G)	
794	Cibanone Black	2,202
	Cibanone Black B Paste—(I)	
	Cibanone Black 2G Powder—(I)	
795	Cibanone Yellow R	1,102
	Cibanone Yellow R Paste—(I)	
804	Alizarine Blue S	2,000
	*Alizarine Blue S Powder—(By)	
822	Algol Brill. Orange FR (sgle. stngth.)	5,523
	Vat Brill. Orange FR Paste—(B)	
	Vat Orange RRK Paste—(By)	
830	Indan. Red R (sgle. stngth.)	1,926
	Anthra Red RT Dbl. Paste—(B)	
831	Indan. Red BN (sgle. stngth.)	881
	Vat Red RK Paste—(B)	
832	Indan. Violet RN (sgle. stngth.)	3,439
	Vat Violet BN Paste—(B)	
	Vat Violet BN Powder—(B)	
833	Algol Olive R (sgle. stngth.)	920
	Algol Olive R Powder—(By)	
834	Algol Gray (sgle. stngth.)	6
	Vat Gray GK Paste—(By)	
838	Indan. Blue RS (sgle. stngth.)	1,200
	†Indan. Blue RS Triple Powder—(B)	
841	Indan. Blue GGS (sgle. stngth.)	1,760
	Vat Blue GGS† Dbl. Paste—(B)	
842	Indan. Blue GCD (sgle. stngth.)	2,808
	†Indan. Blue GCD Dbl. Paste—(B)	
	Vat Blue GCD Dbl. Paste—(B)	
844	Algol Blue 3G (sgle. stngth.)	2,544
	Vat Blue 5G Paste—(B)	
849	Indan. Yellow (sgle. stngth.)	154
	Indan. Yellow G Dbl. Paste—(B)	
854	Alizarine Viridine	1,190
	*Alizarine Viridine FF Paste—(By)	

(*Continued on page* 473)

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

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Lowell Textile School, Lowell, Mass.

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Charles S. Hollander, Chairman, Rohm & Haas Company, Philadelphia, Pa.
Percival Theel, Secretary, Philadelphia Textile School, Philadelphia, Pa

MAY MEETING AND FIRST ANNUAL DINNER RHODE ISLAND SECTION

The May meeting and first annual dinner of the Rhode Island Section of the American Association of Textile Chemists and Colorists was held at the Turk's Head Club, Providence, R. I., Friday evening, May 9, 1924.

The May meeting was held in conjunction with the first annual dinner of the section, the purpose of the dinner being to promote a more mutual and friendly feeling among the members, thus forming greater interest in the Association.

Immediately after an excellent steak dinner, which was scheduled for 6.45 P. M., Ralph F. Culver, chairman, called the business meeting to order, pursuant to which he introduced Professor James A. Hall, of Brown University, who presided as toastmaster for the evening's program. Short talks were given by R. L. Fletcher, engineer of manufacture of the Providence Gas Company; Dr. Samuel T. Arnold, chairman Rhode Island Section of American Chemical Society, and Dr. R. K. Strachan, chemistry department, Brown University.

The main address for the evening was presented by Richard E. Steed, store manager, Gladding Dry Goods Company, Providence, R. I., his subject dealing with the textile fabrics and colors from the retailers' and consumers viewpoint. This address was published in the Proceedings, June 30, 1924.

Entertainment was furnished by Theodore A. Hunt, piano; Ethel M. Benson, soprano, and Ira C. Williams, magician. The attendance was seventy-five.

TWENTY-FOURTH COUNCIL MEETING

The twenty-fourth Council Meeting of the American Association of Textile Chemists and Colorists was held at the Engineers Club, Boston, Mass., on June 27, 1924.

The following members were in attendance: L. A. Olney, W. D. Livermore, W. C. Durfee, A. E. Hirst, G. A. Moran, W. K. Robbins, W. M. Scott, H. Christison, W. E. Hadley.

The following were elected to membership in the Association:

Active Members

Blaeser, Paul Robert, 101 Twenty-second Avenue, Paterson, N. J. Boss Dyer, Textile Dyeing Company, Inc., New York, N. Y.

Bower, Ernest F., Southern Worsted Corp., Greenville, S. C. Overseer of Dyeing and Printing.

Carruthers, Harry G., Garnerville, N. Y. Foreman Dyer, Rockland Finishing Company.

Copithorne, Herbert C., 17 Spring Hill Terrace, Somerville, Mass. Superintendent of Printing, K. M. Gilmore & Co.

Dabbs, Ben. R., Annex Hotel, Chattanooga, Tenn. Dyestuff Salesman, 232 W. First Street, Charlotte, N. C.

Dimon, Milton G., Newport Chemical Works, Boston, Mass. Dyestuff Demonstrator.

Klein, Samuel, Calco Chemical Company, New York, N. Y. Department Sales Manager.

Koehler, Albert E., 5632 Tulip Street, Philadelphia, Pa. Superintendent of Dyeing, Kaufman Plush Company, Manayunk, Philadelphia, Pa.

Raskin, Nathan, 874 East 165th Street, Bronx, N. Y. Textile Chemist, American Aniline Prod., Inc.

Schoen, Andre, 170 Market Street, Paterson, N. J. Chemist, United Piece Dye Works, Lodi, N. J.

Schug, Walter, 200 Highpoint Avenue, Weehawken, N. J. Dyer, Hasco Dyeing Company.

Siever, Hughes L., 124 South Main Street, Keyser, W. Va. Salesman, Borne, Scrymser Company, New York, N. Y.

Smith, R. Bigham, 104 Clayton Street, Macon, Ga. Salesman, Borne, Scrymser, Company, New York, N. Y.

Stone, Chas. H., Box 79, Charlotte, N. C. Dyestuff Sales Executive, Grasselli Dyestuff Corporation.

Trimble, Warren W., Garnerville, N. Y. Colorist, Rockland Finishing Company.

Whattam, Thomas W., Sandoz Chemical Works, 240 Water Street, New York, N. Y. Colorist.

Winkler, Julius P., 141 Pine Street, South Manchester, Conn. Dyer, Cheney Bros.

Junior Members

Bragdon, Stacy Lloyd, 20 Codwise Avenue, New Brunswick, N. J. Textile Colorist, Calco Chemical Company, Bound Brook, N. J.

Campbell, George Albert, 31 May Street, North Andover, Mass. Assistant Chemist, Dyestuffs Corporation of America, Boston, Mass.

Carter, John C., Jr., Calco Chemical Company, New York. Demonstrating Salesman.

Chase, Harold D., P. O. Box 407, North Adams, Mass. Cotton Finisher, Arnold Print Works.

Costello, John L., John Campbell Company, 2433 Orianna Street, Philadelphia, Pa. Salesman.

Dingee, Harold W., 2607 Jerome Avenue, New York, N. Y. Demonstrator-Salesman, Zinsser & Co., Hastings-on-Hudson, New York.

Houth, Joseph, Jr., 19 Columbia Street, New Bedford, Mass. Student, New Bedford Textile School.

Purnell, William E., 36 Burton Street, Bristol, R. I. Second Hand in Dye House, Cranston Worsted Mills.

Smith, Walter C., Short Hills Avenue, Millburn, N. J. Assistant Textile Chemist, American Aniline Prod., Inc., New York, N. Y.

Taylor, Oscar C., Y. M. C. A., Lawrence, Mass. Second Hand in Dyehouse, Farwell Bleachery.

Triesnor, Robert E., 646 Eagle Ave., The Bronx, N. Y. Colorist, Calco Chemical Company, Bound Brook, N. J.

Dr. H. C. Chapin, of the Lowell Textile School, and John G. Stott, Jr., of Greensboro, N. C., were changed from Junior to Active Membership.

The meeting was largely devoted to the discussion of the data which is to appear in the coming Year Book, which should, within a short time, be in the hands of all members of the Association.

Respectfully submitted,

W. E. HADLEY, Secretary.

TWENTY-SECOND RESEARCH COMMITTEE MEETING

The twenty-second Research Committee Meeting of the American Association of Textile Chemists and Colorists was held at the Engineers Club, Boston, Mass.

The following members were in attendance: L. A. Olney, W. D. Livermore, W. C. Durfee, A. E. Hirst, G. A. Moran, W. K. Robbins, W. M. Scott, H. Christison, W. D. Appel, H. W. Leitch, W. J. Murray, W. E. Hadley.

H. Christison, chairman of committee in charge of formulating tests regarding the action of perspiration, reported progress. He is to prepare a paper upon this subject which will be published within a short time in the Proceedings.

W. E. HADLEY, Secretary.

APPLICANTS FOR MEMBERSHIP

Active

Kidd, Thomas S., dyer, Passaic Piece Dye Works, Passaic, N. J. Sponsors: W. E. Mitchell and C. A. Puller.

Rittger, Albert R., salesman and demonstrator, A. Klipstein & Co., New York, N. Y. Sponsors: G. Lommel and J. Beck.

Church, Kenneth B., chemist, Aspinook Company, Jewett City, Conn. Sponsors: W. Witte and E. A. Sherburne.

Junior

Dickerson, Wm. G., chemist, Consolidated Piece Dye Works, Paterson, N. J. Sponsors: D. S. Moss and Giles Low.

CHANGES IN ADDRESSES OF MEMBERS

Battye, Horace G., Toronto Carpet Manufacturing Company, Toronto, Canada

Bloxham, C. W., 65 Englewood Avenue, Pawtucket, R. I.

Chen, W. P., 529 W. 123rd Street, New York City, N. Y.

Feindel, George P., Burrson Knitting Mills, Rockford, Illinois.

Goldthwaite, Charles F., care of H. K. H. Silk Company, Watertown, Conn.

Hurwitz, Jacob, Burson Knitting Mills, Rockford, Ill.

Newton, Oscar A., 116 Academy Avenue, Providence, R. I.

Weber, Edward, manager of Application Laboratories, 351 Abbott Road, Buffalo, N. Y.

AMERICAN
DYESTUFF REPORTER
SAMPLE SWATCH QUARTERLY
Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.
LOUIS A. OLNEY
PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL
Directing Editor
CLAYTON HOAGLAND
Managing Editor
Published biweekly by
HOWES PUBLISHING CO., INC.
90 William Street, New York City
A. P. HOWES, *President* E. S. PREDMORE, *Secretary*

JULY 14, 1824

SURPRISING DYE PROGRESS

A RECENT number of the AMERICAN DYESTUFF REPORTER contained announcements of the American manufacture of ten new dyes, new in respect to American production. They are prototypes of foreign colors, but some are claimed to have improved properties. Most of them are specialties, dyes that have some particularly useful quality of fastness, or of working properties. We do not expect to find so many brand-new colors mentioned in every issue, but advertisements or reports of new and interesting dyes have been especially frequent during recent months.

We were surprised at the list of 126 dyes recently compiled by the Synthetic Organic Chemical Manufacturers' Association as having been manufactured by eighteen different firms since the present tariff act went into force.

The American industry is said to now make 93.5 per cent of our total requirements, and a recent report by the Department of Commerce characterizes the domestic industry as more nearly self-sufficient as to raw materials than that of Germany.

These reports all cover a period of severe depression in the textile industry, during which the universal report of dye salesmen has been poor business, no business, or "rotten."

With all these advances while dye consumption has been severely cut, we shall look forward to the rapid rise of domestic manufacturers to supremacy in this field, if we have continued reasonable protection, during the coming return of business prosperity.

D 13—EXPONENT OF PREPAREDNESS

NO, this is not the name of a submarine or an airplane, but represents the very active Textile Materials Committee of the American Society for Testing Materials from whose recent meeting at Atlantic City some interesting lessons can be learned.

In many respects this committee is analogous to the research committee of the American Association of Textile Chemists and Colorists, which is also deveolping standards for the testing of textiles.

In neither case is the importance of the work reflected by the demand for it, and the workers who are toiling, patiently and more or less unnoticed, in these fields are laying the foundations for methods that will become widely recognized and come into daily use in the specifying of materials.

The development of such standards requires time; not only hours spent in actual labor, which mount up to a startling total, but time for testing tentative methods and for practical experience with them; time to try them in various mills or laboratories where conditions and requirements are not always similar; time to go over the same ground as revisions are made; and finally, thorough tests of the methods before being officially adopted.

It is gratifying and encouraging to learn that the work of the A. S. T. M. committee is being appreciated to the extent of manufacturers and organizations of manufacturers attending the meetings and asking for membership, as well as suggesting new work. Much has been accomplished in cotton standards of various sorts, and while most of them are mechanical, they are not without interest to textile chemists.

As typical of their work, at the last meeting, reports were presented on Cotton Yarns, Singles and Plied; Electrical Cotton Yarn; Cotton Sewing Thread and Cement Sacks. All but the last item are products of cotton yarn converting, and are often subject to processing that may leave traces of deleterious chemicals in the goods. Since there are frequent arguments based on the claim that mercerized yarn may have been made tender or that Sulphur Black has weakened sewing thread, and other complaints which are more or less fantastic, there is no telling how soon standard tests may be necessary for reference, even in plants which have up to the present time scarcely thought of them.

The wool men have recently become interested and preliminary work has been begun on both wool and knit goods. It has also been decided to start an investigation on narrow fabrics. Such work is always found to be more complicated than would be expected. Even the simplest of tensile strength tests will vary with the weather, which determines the degree of humidity of the atmosphere. It has proved especially difficult in knit goods to get the same results on the same piece of fabric in different laboratories or even on the same testing machine at different times.

Of special interest to us all is the possibility of some day having a rational "Truth-in-Fabrics" law, based on the strength and quality of the goods, rather than on some arbitrary statement of their composition. The next step beyond this will be definite commercial degrees of fastness, which may form part of the descriptions of fabrics.

The lesson from this meeting of the Association is for the manufacturer rather than for the chemist. There is a demonstrated need for standard tests, and no one can say where the demand is going to stop or how soon it will

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become more insistent. So far the work has been carried on by a relatively few far-sighted individuals who have already laid a good foundation. The investigations of the American Society for Testing Materials seem to be getting their deserved support, and no doubt a proper interest and more inadequate support will develop as the American Association of Textile Chemists and Colorists produces further tangible results.

T. C.'S COLUMN

TO THE BUSINESS MAN WHO HIRES CHEMISTS

IT will not be amiss to address one "T. C." to the textile executive who hires the chemist, but is all too prone not to follow up his work after the hiring is done; to the one who knows that there is a chemist in the organization but hardly knows why; and to the one who thinks: "A chemist is a chemist" without further thought as to the logic of this view.

By chemist we are thinking of the man of some experience, who can do more than make routine analyses and dye tests, and who has executive ability; and it is intended to point out briefly why you should have a chemist of the right type fit into, or grow into, your organization, for he can become of very great value to it.

In the first place, any new man like a chemist, who can improve, or thinks that he can improve on things that are being done, is placed at a great disadvantage if he has to sell his services, for he is necessarily in the position of telling his prospective employers that they do not know what they are up to, and no matter how true it is, or how well they know it, they do not like to be told. We are confronted in this discussion with just the same kind of a problem in diplomacy.

Suppose that you represent a textile firm and have a business matter for a lawyer. What do you do, retain the young man around the corner who has just put up his shingle, because his services will come cheap? Not at all, unless it is a very minor affair. Far more likely you engage the best lawyer in town, if he is not already connected with your company, or you send outside for expert corporation counsel. Many times the talent may be far higher than required for the business in hand, but you wish to play safe. Chemists are like lawyers—there are all degrees of experience and ability, and each has his place, but when you need a *man*, do not "send a boy to mill."

The good business man requires and understands exact statements of money spent for supplies, labor, and the various large items for overhead. But, strange to say, as soon as the money has been spent for the supplies, he is quite content to rely on *opinions* as to the way in which many of them shall be used. Opinions are often extremely valuable, and have to answer when facts are lacking, but when it is possible to have knowledge, or at least *expert* opinions on such technical matters, at a cost not out of proportion to their importance, is it good business not to have them?

You have a purchasing agent who is a man competent to spend thousands of dollars of your money every year. He handles many complicated problems, but few of them involve the technical knowledge required for the intelligent purchase of dyes. You expect him to use a lot of common sense, but no doubt realize that he cannot know all about the properties and uses of everything that he buys. Machinery can be referred to the superintendent or to the master mechanic. General supplies are easily specified in co-operation with different ones interested in their use.

Dyes are referred to the dyer, sometimes, but he usually has no time to interview the salesman, so things come to him second hand, and however valuable they may be to the firm, are likely not to be appreciated and not to get a fair show. It has been tried and proved that there is no way to buy dyes so efficient as to have the salesman who knows something about his colors present his proposition to the firm's chemist, who knows in detail the mill's requirements. Strength, properties and price are then balanced against those of competing colors. The final purchase is based on facts and value, and the firm gets the benefit, instead of the clever salesman. The same reasoning applies to a certain extent to the purchase of the chemical supplies, and to an even greater extent to the various special products that are offered, a single one of which, to quote an actual instance, was "good for anything and everything from structural steel to the finest of silk." No, your purchasing agent would not have fallen for that one, but there are others, very plausible, but very expensive for the firm, if there is no real check on their use.

The amount that can be spent on the control of such supplies naturally depends on the amount to be spent for them, and the apparent chance for loss or economy. It is not always possible for a laboratory to show a big saving, in definite provable figures every year, for when some things are done they are done for good, and the economy persists year after year as long as the chemist is camped on the job to see that his work is not undone. To prevent something slipping in may be worth as much as to throw something out, but your chemist cannot always demonstrate how much he has saved you thereby, for the result may be quite intangible, but still it is there.

Isn't it common sense, if you are buying any large quantity of dyes and chemicals, where value received for your money is a real object, that you should have as good a man technically as the best of those that are trying to sell you supplies? Anybody can buy some things but dyes are different, else, why would the color companies have absorbed so much of the real talent? The man that knows and specifies for the purchase of your dyes should know as much and be worth as much in salary as the good salesmen whom he meets.

It should be the chemist's function not only to guide the purchasing and help keep things going properly in the plant, but, as well, to accumulate the facts that guide the business, even into new channels if necessary. There are reasons for every technical procedure, but too often the only known reason for doing a thing is the fact that it is known to work and nobody dares try anything else. The real reason for everything that is done should be known, should form a part of the plant records, and be treated with even more respect than the accounting records, for it will eventually show where more money *can be made*, rather than merely where it has already been made, or lost.

For instance, who can tell how much money has been saved in buying cotton, unsuitable for bleaching, and then lost in trying to bleach it? Money is often lost in ways which appear to be good business, but do not prove to be good technique.

Lack of space forbids our detailing the various things that a real textile chemist, with an eye out for the bigger of them, can do around a textile plant. There are still startling wastes, and many antique and expensive ways of doing things. Records such as we have suggested lead to a study of them all, and will inspire attempts to apply proper remedies. There are numberless small economies that can be made here and there by closer control of a process, saving waste of goods, waste of chemicals, or helping to prevent seconds, and all footing up to a surprising total.

Mill experiments are often a great source of loss. I have more than once seen five and ten thousand dollar experiments made, and fail, just on somebody's hunch, and without the slightest attempt to find out whether there was a reasonable chance of success. Avoiding such performances is another way to save money. Analysis of proposed experiments by a competent chemist who has been long enough in your employ to understand your purpose and your conditions, will more likely lead to a correct decision than any other means. He may save you a great deal of money in this way, but he cannot always prove it, and so, especially if he comes in conflict with some of the officers, he may miss the recognition that should go with real value to the firm. You cannot always know what you lose, and "where ignorance is bliss" perhaps "'tis folly to be wise," but in a textile plant it is certainly expensive.

Not only must the chemist do his part, but the employer, too, must do his. He can rate the chemist as a department head, and treat him and the laboratory as important units from which much is expected, and especially let the impression go out among foremen and other plant executives, that in his opinion the chemist is something besides a mere pay-roll incumbent. There is nothing so discouraging as the attitude: "Probably it will not amount to much, but we will try it," which is sometimes taken by those immediately responsible for having a laboratory installed, and then setting a chemist to work in new surroundings and with little or no encouragement.

It must be realized that textile chemistry is a branch of the science that requires long and serious study to master, and that one who has it well in hand may not have had time to acquire a familiarity with business ideas and methods. Many chemists have as much inherent business ability as the younger and inexperienced business men, so the logical policy is to discuss with your chemist the things that he can do and their bearing on the aims and policies of the firm, insisting especially that he get an insight into the business side, and understand *how* things must be done in order to make money.

T. C.

FOREIGN DYES IMPORTED THROUGH PORT OF NEW YORK DURING JUNE

(*Continued from page* 468)

855	Alizarine Pure Blue	475
	Alizarine Sky Blue B Powder—(By)	
856	Alizarine Astrol	1,102
	Alizarine Blue AS Powder—(By)	
858	Alizarine Saphirol B	930
	Alizarine Saphirol WSA—(By)	
	Alizarine Blue SAWSA Powder—(By)	
860	Cyananthrol G	1,444
	Alizarine Direct Blue BGAOO—(B)	
862	Alizarine Blue Black	7,951
	†Alizarine Blue Black B Powder—(By)	
	†Alizarine Blue Black 3B Pdr.—(By)	
865	Alizarine Direct Green G	469
	Alizarine Cyanine Green G—(By)	
	Alizarine Cyanine Green 3G—(By)	
867	Indan. Brown B (sgle. stngth.)	2,324
	Anthra Brown B Dbl. Paste—(B)	
	Indan. Brown B Dbl. Paste—(B)	
885	Brilliant Indigo B (sgle. stngth.)	3,066
	Brilliant Indigo B Paste—(B)	
893	Alizarine Indigo G	340
	Alizarine Indigo G Powder—(By)	
895	Alizarine Indigo 3R	159
	Alizarine Indigo 3R Powder—(By)	
897	Ciba Heliotrope B (sgle. stngth.)	1,133
	Ciba Heliotrope B Paste—(I)	
	Ciba Heliotrope B Powder—(I)	
901	Ciba Violet B (sgle. stngth.)	9,259
	*Ciba Violet B Paste—(I)	
907	Ciba Scarlet:	
	Ciba Scarlet G Ex. Powder—(I)	2,700
	Helindone Fast Scarlet G Paste—(M)	500
908	Ciba Red R Paste 20%—(I)	882
912	Ciba Pink B	220
	Ciba Pink B Paste—(I)	
913	*Thioindigo Orange R Paste—(K)	500
918	Helindone Red 3B	500
	Helindone Red 3B Paste—(M)	
920	Helindone Violet (sgle. stngth.)	550
	*Helindone Violet B Powder—(M)	
239	Ursol	2,050
	Nako DR—(M)	
	Nako Black DBB—(M)	

UNIDENTIFIED DYES

Acid Dyes

Name of Dye and Manufacturer	Quantity (pounds)
Acid Anthracene Brown KE Powder—(By)	6
Alizarine Direct Blue A—(Q)	200
Alizarine Leveling Blue BBS—(C)	50
*Alizarine Rubinole 3G Powder—(By)	353
Alkali Fast Green 10G—(By)	6
Azo Acid Black B—(M)	300
Brilliant Acid Blue CB—(By)	6
*Brilliant Pure Yellow 6G Extra—(By)	220
†Cloth Red G—(By)	50
Fast Light Red GL—(By)	6
Guinea Brown 2R—(A)	10
Kiton Blue A—(I)	661
New Acid Green 3BX—(By)	110
Supramine Bordeaux B—(By)	6
Supramine Brown G—(By)	6
*Supramine Yellow R—(By)	331

Vat Dyes

Algol Blue FB Paste—(By)	11
Alizarine Indigo Black B Paste—(By)	11
Alizarine Indigo Green BB Paste—(By)	551
Alizarine Indigo Green G Paste—(By)	11
*Ciba Printing Black B Paste—(I)	2,094
*Ciba Printing Black G Paste—(I)	1,211
Hydron Black B (sgle. stngth.)—(C)	3
Hydron Brown (sgle. stngth.)	3,522
*Hydron Brown G Paste—(C)	
Hydron Brown G Powder—(C)	
Hydron Brown R Powder—(C)	
Hydron Pink FF Paste—(C)	440
*Hydron Scarlet BB Paste—(C)	200
Hydron Sky Blue FK Paste—(C)	150
Hydron Violet R Powder (sgle. stngth.)—(C)	250
Hydron Wool Brown D—(C)	25
†Hydron Yellow NF Paste—(C)	1,000
Vat (Indan.) Blue RZ (sgle. stngth.)	4,244
Vat Blue RZ Dbl. Paste—(B)	
Vat (Indan.) Orange 3R Paste—(B)	4,180
Vat. (Indan.) Pink (sgle. stngth.)	3,636
Vat Pink B Dbl. Paste—(B)	
Vat Pink B Dbl. Paste Fine—(B)	
Vat Orange 3R Paste—(B)	440
*Vat Red Violet RRK Paste—(By)	110

Mordant and Chrome Dyes

Acid Alizarine Gray G—(M)	1,000
Acid Chrome Blue 3RX—(By)	6
Acid Chrome Yellow RL Extra—(By)	6
Alizarine Fast Light Red 5G Powder—(By)	6
Chromazurine DN—(DH)	121
Chrome Brilliant Yellow 3G—(By)	6
Chrome Fast Blue FB—(A)	5
Chrome Green BD, GD Extra—(By)	11
*Chrome Printing Red B—(DH)	110

Schultz No.	Name of Dye and Manufacturer	Quantity (pounds)
	Chromorhodine BB—(DH)	110
	Chromoxane Azurol BD Powder—(By)	6
	Diamond Black P2B Conc.—(By)	16
	Eriochrome Green L—(G)	110
	Metachrome Green 3G—(A)	10
	Metachrome Olive B, D—(A)	20
	Modern Green N—(DH)	110

Direct Dyes

	Benzo Fast Brown	551
	*Benzo Fast Brown 3GL—(By)	
	Benzo Fast Brown RL—(By)	
	Benzo Fast Heliotrope 2RL—(By)	249
	Benzo Fast Light Scarlet 4BL—(By)	6
	Benzo Fast Scarlet 6BSL—(By)	16
	Benzo Green O—(By)	6
	Benzo Rhoduline Red 3B—(By)	10
	Benzoform Blue G Extra—(By)	6
	Benzoform Green FFL—(By)	6
	Benzoform Violet 2BF—(By)	6
	Brilliant Benzo Green B—(By)	99
	Brilliant Benzo Violet 2R—(By)	110
	Brilliant Congo Violet R—(A)	10
	Brilliant Sky Blue 8G Extra—(By)	110
	*Brilliant Sky Blue 2RM—(By)	1,499
	Chloramine Fast Yellow B—(By)	6
	†Chlorantine Fast Yellow RL—(I)	661
	Developing Black ED, FFN, OB, OT—(C)	795
	*Developing Blue 2R—(A)	500
	Diamine Fast Brown GB—(C)	100
	*Diazanil Blue 2R—(M)	1,000
	Diazo Brilliant Blue 2BL Extra—(By)	6
	Discharge Blue B—(By)	6
	Diazo Brilliant Orange 5G Extra—(By)	25
	*Diazo Indigo Blue 4GL Extra—(By)	948
	Diazo Sky Blue 3G—(By)	1,000
	*Ionamine B—(BD)	50
	*Ionamine Red KA—(BD)	25
	Naphthogene Blue B—(By)	500
	Oxamine Black BBNX—(B)	100
	Oxydiamine Brown	22
	Oxydiamine Brown G—(C)	
	Oxydiamine Brown KRS—(C)	
	Oxydiamine Brown RN—(C)	
	Oxydiamine Brown 3GN—(C)	
	Oxydiamine Yellow CR—(C)	1
	*Rosanthrene Orange R—(I)	772
	Toluylene Fast Brown 2R—(By)	10
	Zambesi Black D—(A)	500

Sulphur Dyes

	Katigene Bronze LX Extra—(By)	6
	Katigene Brown VR Extra—(By)	6
	Katikene Deep Black BN, FGC, TN—(By)	17
	Katikene Orange O—(By)	6
	Katigene Yellow Brown RLX, 3RLX—(By)	11

Name of Dye and Manufacturer	Quantity (pounds)
Sulphide Violet V—(M)	100
Sulphur Brilliant Blue CLB—(A)	1,000
Basic Dyes	
Rhoduline Sky Blue 3G—(By)	6
Color Lake Dyes	
Helio Bordeaux BL Powder—(By)	198
Helio Fast Violet 2RL—(By)	6
Helio Red RMT Powder—(By)	6
Unclassified Dyes	
Blue Dye No. 1—(Q)	11
Blue Dye No. 2—(Q)	2
*Celatine Blue—(BD)	230
*Celatine Red—(BD)	30
*Celatine Red Violet—(BD)	130
*Celatine Yellow—(BD)	30
All other dyes—(Q)	51

Technical Notes from Foreign Sources

Dyeing Turkey Red

There are quite a few methods used in the dyeing of Turkey Red in which the fabric is mordanted before the dyeing operation, and a review of these methods is given in an article which appeared in the Bulletin Societe Industrie Mulhouse, volume 90, year 1924, pages 72 to 79.

The methods discussed are those in which the fabric is mordanted before dyeing with oil and alumina or with alumina first and then with oil, or where the fabric is mordanted after dyeing, by the so-called padding process, with alizarine. One of the processes discussed was the Schlumberger process. This process is rapid and the the fabric is padded, after dyeing, with a mixture containing the dyestuff Alizarine Red 4D, and the sulphoricinoleates of ammonium and tin (stannic). The fabric is then dried in a hot flue, steamed, passed through a mordanting liquor containing the acetates of calcium and alumina. The goods are then dried and steamed for a period of two hours. The shade may be brightened by padding with an oil mordant, steaming and soaping.

In this process the calcium acetate and the aluminum acetate may be replaced by the corresponding lactates, together with stannic lactate, and stannic sulphoricinoleate has then to be employed.

The Schlieper process is a rapid process and yields excellent shades. The fabric is padded with sodium aluminate, then dried on drying drums, hung up for several hours, treated with a warm aqueous suspension of chalk and then with a solution of calcium chloride for the complete fixation of alumina. The goods are then dyed in open width for several minutes at a temperature of 90 deg. Cent. in a bath containing 88 to 100 grams of lime for each kilogram of alizarine, then padded with rincinoleic acid, steamed under low pressure and soaped. The shade may be brightened by treatment with a warm liquor containing an oil mordant, which is followed by steaming.

Dyeing with Vat Dyes

In a process of dyeing fabrics with vat dyestuffs, the goods are taken from the vats and are then boiled with a solution of sodium hydrosulphite to remove the excess of the leuco compound. Then the fabric is treated as usual with cold water and oxidized. It is claimed that this process gives colors which are fast to rubbing. This process is patented by Lucius und Bruening in German Patent No. 390,930.

Electrolytic Printing

An interesting process of electrolytic printing is described in German Patent No. 388,724, assigned to the Allgemein Elektrizitaets Ges. The paper fabric or the like is saturated in places, as desired, with a colloidal solution of sulphur. Then it is dried and saturated again with a solution of lead nitrate which contains some calcium nitrate. On making the treated paper the cathode in an electrolytic apparatus and passing a current, interaction takes place to yield a dark precipitate of lead sulphide on the treated portions. In the place of lead nitrate salts of other metals forming deeply colored stable sulphide may be employed.

Dyeing with Mineral Colors

An interesting process for dyeing materials, such as animal, vegetable or artificial fibers and fabrics, fur, etc., is described in British Patent No. 211,178 and consists of immersing the material in a dye bath containing a colloidal dispersion of an insoluble mineral or half mineral pigment and then coagulating the dispersion on the fabric. The coagulation may be affected physically, for example, by heat, ultra-violet light or the electric current, or by colloidal chemical methods, such as by the addition of colloids of opposite polarity but different intensity of charge, or by the addition of an electrolyte, particularly compounds of divalent or trivalent metals, or of an organic compound containing halogens, sulphur, nitrogen, etc.

An example is given of dyeing cotton with a dispersion of carbon, which is preferably prepared by dispersing in a colloid mill, a carbon obtained from an organic material such as peat by very slow combustion, using as a dispersator sulphite cellulose liuor or a colored body such as iron tannate or gallate, divi-divi, Aleppo galls, algarobilla,

logwood, extract of blue wood, or other substance which forms lakes with alum or copper, cobalt, iron, chromium or other salts. Lakes of alizarine or other dyestuffs may be added to the bath. The cotton is immersed in the dye bath to which is added alum or other electrolyte and which is then heated to boiling. The goods may be brightened by treatment with gelatine, agar-agar, gum arabic and tannin, aldehydes, alum, etc., or with sulphonated fats and oils, drying oils, rubber solutions, etc.

The process is also mentioned as being particularly advantageous for dyeing cotton with collodal ultramarine, artificial silk, wool, silk, cellulose acetate silk, etc.

Physical Characteristics of Cotton Fiber

An article contained in the Journal of the Textile Institute, volume 14, pages 489-492T is concerned with the determination of two physical constants of raw cotton, the area of the cross-section and the hair weight per centimeter. The cross-sectional area was determined by an optical process. Calculations, using the cross-sectional area and weight per centimeter of cotton fibers, indicated that cotton has a density of 0.97 to 1.05, the difference between this and the usually accepted value being due to the porosity of the fibers. In various cottons the amount of pore space was from 32 to 41 per cent of the total volume. It is concluded that the amount of pore space increases with the coarseness of the cotton. With careful sampling mean values of the cross-sectional area and the weight per centimeter of cotton fibers may be determined with an accuracy within 3 per cent if a sufficient number of hairs are employed in the test.

Dyestuffs Tables

A List of the Principal American-Made Colors with Their Properties and Fastness Characteristics

[NOTE: The publishers of The REPORTER have secured more or less complete data in regard to many of the dyestuffs which are at the present time being manufactured in the United States. As the following material has been brought togetner from various sources, they realize that errors are quite likely to appear, and it is earnestly requested that any readers who find errors or who are able to give additional information will communicate with the publishers in order that this material may be made as correct, complete and up to date as possible. These tables will appear serially until all colors upon which we have data shall have been covered. The publication of this data was begun in the issue of March 10, 1924.]

FAST BROWN N
(Schultz No. 160)

COMPOSITION: Mono azo.

SPECIALLY SUITABLE FOR: Wool.

USUAL METHOD OF DYEING: Glauber salt and sulphuric; also top chrome.

SHADE: Golden shade brown.

SOLUBILITY: Good.

LEVEL: Not level dyeing.

EXHAUSTS: Well.

FASTNESS TO:

Acid: Sensitive to acids.
Carbonizing: Not fast.
Fulling: Bleeds into white cotton and white wool.
Ironing: Fast.
Light: Stands fourteen days without much change in shade.
Perspiration: Not fast.
Potting: Not fast.
Rubbing: Heavy dyeings rub slightly.
Scouring: Not fast; bleeds.
Steaming: Not fast.
Street Dirt: Fast.
Sulphur: Fast to stoving.
Washing: Not fast; bleeds.
Water: Not fast to Markischer test.

DYED BY OTHER METHODS: Top chrome loses its golden shade and becomes darker and bluer.

ON UNIONS: Not suitable.

ON OTHER MATERIALS: White cotton and white silk effect threads are stained.

COMPETING PRODUCTS: Made in the United States by Grasselli Chemical Company and American Aniline Products, Inc.

FAST RED A
(Schultz No. 161)

COMPOSITION: Mono azo.

SPECIALLY SUITABLE FOR: Wool and silk.

USUAL METHOD OF DYEING: On wool, with Glauber salt and sulphuric; on silk, with boiled-off liquor broken with sulphuric acid.

SHADE: Bluish red of excellent covering power.

SHADE BY GASLIGHT: Yellower.

SOLUBILITY: Poor; use a lot of hot water.

LEVEL: Requires great care in manipulation to obtain results that are level.

EXHAUSTS: Well.

FASTNESS TO:

Acid: Fast.
Alkali: Goes duller with ammonia and soda.
Carbonizing: Fast.
Fulling: Not fast; stains white cotton and wool badly.
Ironing: Fast.
Light: Very fugitive; shade changes after a few days' exposure.
Perspiration: Fast.
Potting: Not fast; bleeds badly.
Rubbing: Rubs very slightly.
Scouring: Not fast; bleeds badly.

Steaming: Good fastness; stands one hour's steaming at 15 pounds' pressure.
Street Dirt: Fast.
Sulphur: Fast.
Washing: Not fast.

DYED BY OTHER METHODS: Chrome mordant browner in shade and faster to washing. Top chrome gives a full claret shade.

ON UNIONS: Wool-silk unions dyed with sulphuric, both fibers nearly equal. Dyes wool in a neutral bath a full shade. Cotton-wool unions dyed acid. The cotton is slightly stained.

ON OTHER MATERIALS: Silk: Dyed with boiled-off liquor and sulphuric acid. Not fast to water or soap. Paper: Not suitable for wood pulp. Fastness to light fairly good.

PRINTING: Suitable on wool and silk.

DISCHARGING: Tin crystals give a dull yellow; sulphoxalates give a good white.

COMPETING PRODUCTS: Made in the United States by American Aniline Products, Inc.; Calco Chemical Company; John Campbell & Co.; Central Dyestuff & Chemical Company; Cincinnati Chemical Works; E. I. du Pont de Nemours & Co.; Heller & Merz Company; National Aniline & Chemical Company; Sherwin-Williams Company; Commonwealth Color & Chemical Company; Newport Chemical Works.

BRILLIANT FAST RED G

(Schultz No. 162)

COMPOSITION: Mono azo.

SPECIALLY SUITABLE FOR: Wool and silk.

USUAL METHOD OF DYEING: Glauber salt and sulphuric acid.

SHADE: Clearer and yellower than S-161.

SHADE BY GASLIGHT: Duller.

SOLUBILITY: Same as A.

LEVEL: No better than A.

EXHAUSTS: Well.

FASTNESS TO:

Acid: Good; same as Fast Red A.
Alkali: Duller with ammonia and soda; same as Fast Red A.
Fulling: Moderate; stains white wool and white cotton.
Ironing: Fast.
Light: Fugitive; changes shade same as Fast Red A.
Rubbing: Moderate; same as Fast Red A.
Scouring: Moderate; same as Fast Red A.
Steaming: Fast.
Sulphur: Fairly fast.
Washing: Moderate; same as Fast Red A.

OTHER PROPERTIES: This color is chiefly of interest for cotton-silk unions.

ON UNIONS: Wool-silk unions: the wool is dyed deeper than the silk. Cotton-wool unions: in acid bath the cotton is barely tinted and the color is consequently suitable for two-color effects:

ON OTHER MATERIALS: On silk: Dyes well but is not faster to water than Red A. Well adapted for red effects on cotton-silk unions in a neutral bath, as the cotton is only slightly tinted and the color will stand a weak chlor to clear the cotton.

PRINTING: Adapted for printing on wool.

DISCHARGING: Discharges white with sulphoxalates.

COMPETING PRODUCTS: Made in the United States by American Aniline Products, Inc., and Garfield Aniline Works.

AZO RUBINE

Dyed Direct

(Schultz No. 163)

COMPOSITION: Mono azo.

SPECIALLY SUITABLE FOR: Wool.

USUAL METHOD OF DYEING: Glauber salt and sulphuric acid.

SHADE: Bright bluish red.

SHADE BY GASLIGHT: Redder.

SOLUBILITY: Excellent.

LEVEL: Excellent; can be added at the boil.

EXHAUSTS: Not as well as S-164.

FASTNESS TO:

Acid: Fast.
Carbonizing: Fast.
Fulling: Stains cotton badly; white wool is only slightly tinted.
Ironing: Fast.
Light: One of the best of the acid reds.
Rubbing: Fast.
Scouring: Bleeds slightly.
Steaming: Not fast; shade goes bluer.
Street Dirt: Fast.
Sulphur: Not fast; shade changes slightly.
Water: Markischer test O. K.

ON UNIONS: Gloria: Dyed with acetic acid the silk is tinted a little. Cotton-Wool: Dyed acid the cotton is left very nearly white. Cotton-Silk: Dyed acid the cotton is stained.

ON OTHER MATERIALS: Silk: Dyed with boiled-off liquor and sulphuric acid; fast to light.

PRINTING: Suitable for direct and discharged printing.

DISCHARGING: Hydrosulphite discharges the color white.

COMPETING PRODUCTS: Made in the United States by American Aniline Products, Inc.; John Campbell & Co.; Central Dyestuff & Chemical Co.; Cincinnati Chemical Works; E. I. du Pont de Nemours & Co.; Grasselli Dyestuff

(Continued on page 479)

Things Every Textile Chemist Should Know

No. 10—A Brief Resume on Chlorine Bleaching

CHLORINE is the universal bleaching agent for cotton and other vegetable fibrous materials, the bleaching action being brought about by the interaction of chlorine and water, whereby hydrochloric acid is produced and nascent oxygen liberated, the nascent oxygen acting upon the organic coloring matter contained in the fibers being treated.

The chlorine used in bleaching may be obtained from several different sources, i. e., bleaching powder, sodium hypochlorite or liquid chlorine.

Bleaching Powder

Bleaching powder is a white amorphous powder which should be free from lumps. It is prepared by treating a good grade of slaked lime ($Ca(OH)_2$) with chlorine gas (Cl_2).

$$Ca(OH)_2 + Cl_2 = Ca(OCl)Cl + H_2O$$

When bleaching powder is mixed with water, its molecular structure is changed as follows:

$$2Ca(OCl)Cl = Ca(OCl)_2 + CaCl_2$$

Carbon dioxide reacts with calcium chloride

$$CaCl_2 + H_2CO_3 = CaCO_3 + 2HCl$$

Carbon dioxide reacts with calcium hypochlorite and produces hypochlorous acid

$$Ca(OCl)_2 + H_2CO_3 = CaCO_3 + 2HClO$$

Hydrochloric acid reacts with hypochlorous acid and produces

$$2HCl + 2HClO = 2H_2O + Cl_2$$

The water is decomposed by the chlorine with liberation of nascent oxygen which actually accomplishes the bleaching:

$$H_2O + Cl_2 = 2HCl + O_2$$

Sodium Hypochlorite

Sodium hypochlorite may be prepared by at least three methods:

(1) By treating bleaching powder solution with sodium carbonate or sodium sulphate solution, the following reaction taking place:

$$Ca(OCl)_2 + Na_2CO_3 = CaCO_3 + 2NaOCl$$

(2) By passing liquid chlorine into solution of sodium hydroxide or sodium carbonate or mixture of both, until chlorination is complete:

$$2NaOH + Cl_2 = NaOCl + NaCl + H_2O$$
$$Na_2CO_3 + Cl_2 = NaOCl + NaCl + CO_2$$
$$H_2O + Cl_2 = 2HCl + O$$

This method of preparation leaves the solution quite strongly alkaline. This type of solution evenly controlled as regards alkalinity is prepared by means of the Wallace & Tiernan apparatus.

(3) By electrolysis of brine (common salt) solution.

The bleaching process, as used in conjunction with cotton fiber has as its object the isolation of a pure cellulose, which, in general, is brought about by two treatments.

(a) Alkaline hydrolysis.
(b) Alkaline oxidation.

(a) The main chemical work is done chiefly by the Alkaline Boiling processes, by which means the non-cellulose impurities are easily removed.

The non-cellulose impurities consist of:

(1) Cotton wax
(2) Fat wax
(3) Pectic acid
(4) Coloring matters, viz., soluble in alcohol or insoluble in alcohol.

The above substances exist as a constituent part of the fiber.

(b) The Alkaline Oxidation is very important but the work demanded of this process is greatly reduced, due to the previous alkaline hydrolysis and the removal, by thorough washing, of the product resulting from the latter treatment.

COURT UPHOLDS TARIFF PROVISIONS AFFECTING COAL-TAR CHEMICALS

A decisions of supreme importance to the American coal-tar industry was recently handed down by the United States Court of Customs Appeals in review of a decision of the Board of General Appraisers in the matter of certain Azoflavine. The particular importation was a very small one, but it was selected by the attorneys for Kuttroff-Pickhardt & Co. to test out three fundamental questions, namely, first, the constitutionality of the coal-tar dye provisions in the tariff act of 1922, second, the power of the appraiser to appraise goods at the American selling price of the competitive article in the absence of a proclamation of the President under the flexible tariff provisions, and third, the burden of proof when imported dyes are appraised as competitive.

These questions have all been answered by the Court in accordance with the contentions of the Government attorneys.

The constitutionality of the tariff act in basing ad valorem duties upon the American selling price of the domestic competitive product is unreservedly upheld by the Court.

The Court holds that the appraiser is at liberty to appraise coal-tar products upon the basis of the American

selling price of the domestic competitive under the terms of paragraphs 27 and 28, and without the need for any proclamation by the President.

The Court further holds that in an appeal by an importer from an appraisement made by the local appraiser upon the basis of the American selling price of the competitive domestic product, the importer assumes the usual burden of an appellant, that is to say, he must furnish affirmative proof of the fact upon which he bases his appeal.

The Court also took action upon the three other appeals of Kuttroff-Pickhardt & Co. involving Crystal Violet, Indra Blue and Benzo Red. The Court did not pass upon the merits of these three cases, but contented itself with remanding them to the Board of General Appraisers with an admonition to follow the direction contained in the statute and make express findings of fact and conclusions of law as a part of its decision.

It should be explained that the tariff act of 1922 gives for the first time a direct appeal to court from a reappraisement proceeding, but upon questions of law only. In order that the issues shall be plainly stated, section 501 of the tariff act of 1922 requires the Board to set forth the facts upon which its findings are based and its reasons therefor. Because the Board failed to do so in the three cases mentioned above, the cases have been remanded.

The Court has now adjourned until October, and the final decisions in the three remanded cases will not be handed down for some months. In the meantime, however, the appraiser is administering the act in accordance with the decisions of the Board from which the importers appealed.

DYESTUFFS TABLES

(*Continued from page 477*)

Corporation; National Aniline & Chemical Company; Newport Chemical Works; Commonwealth Color & Chemical Company; Palatine Aniline Company.

AZO RUBINE

Dyed Afterchrome

(Schultz No. 163)

COMPOSITION: Mono azo.

SPECIALLY SUITABLE FOR: Navies on piece goods, especially with silk-effect threads.

USUAL METHOD OF DYEING: Top-chromed, with addition of 2 to 4 per cent lactic acid, gives greener and brighter shades. For silk-white effects use plenty of acetic.

SHADE: Navy blue.

SHADE BY GASLIGHT: Redder.

SOLUBILITY: Excellent.

LEVEL: Excellent in navy shades.

EXHAUSTS: Not very well with acetic.

FASTNESS TO:

Acid: Fast.
Alkali: Not very fast; color bleeds.
Carbonizing: Fast.
Fulling: Only fair; color bleeds into white silk. S-164 is better.
Ironing: Fair.
Light: Excellent; suitable for men's wear.
Perspiration: Fast.
Rubbing: Fast.
Scouring: Not fast; color bleeds.
Steaming: Fast.
Sulphur: Fast.
Water: Markischer test O. K. on soured goods.

SENSITIVE TO METALS, LIME: Sensitive to copper, turns redder; sensitive to iron, the shade is very dull; not sensitive to lime.

OTHER PROPERTIES: When dyed by silk-white method the goods must be soured with sulphuric acid after speck dyeing.

DYED BY OTHER METHODS: Dyed with acetic acid for silk-white process, the silk is slightly tinted. S-164 is better in this respect.

ON UNIONS: Cotton-effect threads are not stained. Artificial-silk-effect threads are not stained.

ON OTHER MATERIALS: No interest.

COMPETING PRODUCTS: (See list under Azo Rubine, Dyed Direct.)

THREE NEW DU PONT COLORS

E. I. du Pont de Nemours & Co. announce placing on the market three new products, Pontachrome Black PVJ, Du Pont Alizarine Emerald and Du Pont Alizarine Saphirole BR.

Pontachrome Black PVJ, a new chrome color similar in properties to Pontachrome Black PV previously placed on the market, but of a jet shade, is offered for dyeing by the top-chrome method.

Du Pont Alizarine Emerald adds to this company's range of fast-to-light acid colors. It dissolves easily, dyes evenly and penetrates well; the dyeing process being carried out either with Glauber salt and acetic acid, or Glauber salt and sulphuric acid. In the former case, a small amount of sulphuric acid is used for complete exhaustion of the dye bath. It also possesses good fastness to steaming, carbonizing and perspiration, and very good fastness to acids. It is expected to fill a need for use in the dyeing of high-grade dress goods and for mixing with Pontacyl Light Yellow 2G or "3G" for bright greens. In addition to dress goods it is offered for carpet yarns where fastness to light is desired. Chrome causes the shade to become much yellower, which is to be borne in mind if used for shading chrome dyestuffs.

Du Pont Alizarine Saphirole BR, an Acid Blue of greenish shade similar in qualities to Alizarine Saphirole B, may be used on tin-weighted silk for producing fast-to-light shades. Resist silk effect stripes in woolen piece goods are left white in the presence of acetic or formic acid. Cotton and artificial silk threads are left unstained.

The Journal of a Hosiery Dyer

Black on Triple Fiber—Shading Colors for Silk—Stripping—Care of Wood Dye Vessels—Sample Dyeing in Copper Jacketed Kettles

By S. P. R.

Black on Triple Fiber

AUGUST 26.—The first lot of triple fiber goods for black went into developed black, and when they were done the boots were extra fine but the tops, heels and toes were only gray. That was because we used a standing bath with a large amount of Glauber salt in it and the art silk robbed all the color from the cotton. The next time we had to use direct black shaded with blue, and ran the lot at a boil for a half hour before putting in any salt and then only 10 per cent. After washing we ran for twenty minutes in formaldehyde and then finished with soap and a little oil. The developed black can be used on triple fiber if you make a fresh bath of it and use twice as much as you would in the standing kettle and then keep the salt off for a half hour at least. If you only have a few sample lots they can go in with a large lot of silk goods, for then there isn't enough art silk there to take up all the color from the cotton.

Shading Colors for Silk

September 1.—Of course, almost every dye under the sun will dye some color on silk, but it wasn't so easy to pick out a line of tip-top shading colors that would go on silk in a neutral bath and not wash out or streak. When silk hosiery dyeing began to be popular I remember we had Sulphon Cyanine, Fast Red A, Azo Yellow, Metanil Yellow, Acid Violet 4B and a few others. Every one of them has been turned down by first-class dyers except Sulphon Cyanine 3R, and this is only safe on navy blues and cordovans. The best shading colors for the popular fancy shades are Brilliant Acid Blue FFR, Milling Red R, Milling Yellow G, Patent Blue A, Acid Rhodamine, Supramine Brown and a few others I can't remember just now. I got into serious trouble by using up some Resorcin Brown that we had in stock. The next day every shade I had used it in had turned yellower and all had to be redyed. Most of the yellows will wash out when the goods are rinsed, and then it is too late to put any more color on, so it pays to use the right dye in the first place.

Stripping

September 7.—Even with the best dyer there are times when the shade gets a little bit too heavy and some color has to be taken off. The best thing for this is fresh water, providing the color doesn't have to be pulled off too much. After water, a little phosphate of soda or soluble oil will take some more dye off, and sometimes it is necessary to boil in soap for fifteen minutes. In any case the goods must be washed clean before attempting to take off any more dye. When all these means fail and almost all the color has to come off we have to use hydrosulphite. Instead of using decroline and acid at a boil, I prefer to use the regular hydrosulphite at 140 deg. It must not be used any hotter and after it is used it must be washed out well. If it has been in a Monel metal machine the machine will need a thorough cleaning, because of the sulphur compounds that collect on the sides and cause dark stains on the goods.

Care of Wood Dye Vessels

September 13.—There are still some wooden dyeing machines in the place as relics of the old days when there weren't so many light fancy shades, but the trouble comes in using them for the fancy colors when we have to. Of course, we keep them filled with water all the time, but the surface of the wood is almost like a sponge and is ready to let out any kind of a color just when it isn't wanted. I found that a scoopful of chrome and a dipper of vitriol boiled up for a good half hour would set all the old color in the wood and allow us to use a cordovan machine to dye a pearl gray. If we do this every once in awhile we don't have much trouble, but when we boil out with soda ash it only loosens the color and makes it bleed worse. Wood machines are great collectors of lint under false bottoms and in corners and crevices, and this stuff gradually works out and makes pellets on the goods. It is a good plan to have them overhauled and cleaned once a week at least.

Sample Dyeing in Copper Jacketed Kettles

September 20.—There's no feature of the hosiery dyeing business that gives a dyer more trouble than those little two and three dozen lots that have to be dyed in a copper jacket kettle. In the first place, the ratio of water to goods is generally wrong, and whatever formula you work out for the small lot isn't worth much when it comes to dyeing a regular lot. Then the kettle has a bad effect on the color. If the tinning is good we get the effect of tin, and if it is worn off we get the effect of copper. Copper can make some bad looking spots. I see that sulphocyanide of ammonia is recommended to keep the copper from affecting colors, but it is expensive and hard to get so nobody ever uses it. Another bad thing is the hand poling of the goods. You can run a lot in almost any kind of a machine three times as long as you can pole it by hand before it shows signs of overworking. The last bad feature is that it takes a laborer just as long as if he was tending a large lot and costs as much for two dozen as for 200 dozen. At present, there seems to be no way out of it, and it will always be one of the nuisances of the business.

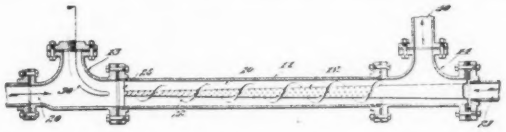
RECENT PATENTS

Apparatus for Mixing Liquids

(1,496,345; June 3)

Frank E. Lichtenthaeler, Newton Highlands, Mass.

An apparatus for mixing liquids having, in combination, a mixing chamber, means for admitting a liquid to one end of the mixing chamber, means for admitting



another liquid into the other end of the chamber, and means for projecting the fine streams of the latter liquid into the stream of the first liquid as it flows through the mixing chamber.

Process for the Preparation of Dyestuffs Consisting in Treating Decacyclene with Sulphuric Acid

(1,496,085; June 3)

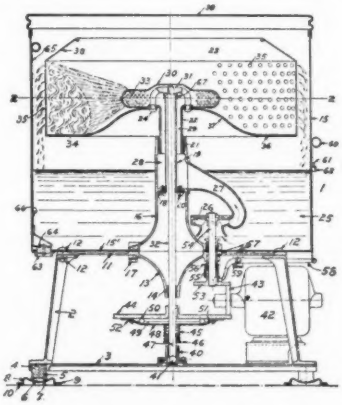
Karol Dziewonski, Cracow, Poland.

A process for the preparation of dyestuffs, consisting in treating 10 parts of decacyclene with 60 parts sulphuric acid, to which 5 grams of 20 per cent fuming sulphuric acid have been added during 6 to 7 hours, dissolving the product obtained in water and adding sodium chloride to the solution to obtain the precipitated sodium salt.

Washing and Drying Machine

(1,496,644; June 3)

In a washing and drying machine, a container for the cleansing liquid, a basket having a perforated side wall



rotatably mounted therein above the level of the liquid, a distributor fixed within said basket to revolve in unison with it and comprising a perforated chambered casing, the chamber of which extends transversely from one side of the casing to the other and is of greater width than depth; means to feed the liquid from said container to said inlet, and means to revolve said basket and distributor.

Process of Dyeing Silk Piece Goods

(1,495,614; May 17, 1924)

Joseph Seyer, assignor to Standard Silk Dyeing Company, Paterson, N. J.

This invention relates to a process of dyeing silk, and more particularly to a process of dyeing silk piece goods in certain colors to produce washable silks.

This application is a division of the original application Serial Number 604,390, filed December 1, 1922, Patent No. 1,446,880, and it particularly covers process No. 3 described in said original application.

Said process No. 3 is applicable for the following colors: Chestnut, S. 3,925; Seal, S. 3,928; Navy 1, S. 6,085; Navy 2, S. 6,925; Navy 3, S. 6,975; Navy 4, S. 6,985; Brown, S. 3,295; Tobacco, S. 3,945; Negro, S. 3,948; Olive Brown, S. 4,856.

The process is conducted as follows: The piece goods are dyed in a continuously boiling water liquor or gum soap liquor, acidulated with (per 250 gallons liquor) 20 pounds acetic acid, using direct dyes according to the shade desired. They are then treated with about six pounds of tannic acid preferably gradually added to the same gum soap liquor comprising about two hundred fifty gallons of liquor as before at a temperature of 160 deg. Fahr. for one hour. They are then washed well and treated in a cold water bath of two hundred fifty gallons with 4.5 pounds tartar emetic for forty minutes, after which they are again well washed. A diazotization is then carried out with 5 pounds sodium nitrite ($NaNO_2$) in cold water comprising two hundred fifty gallons containing 2 pounds sulphuric acid per two hundred fifty gallons of liquor. This diazotization, which lasts twenty minutes, is followed by washing well and developing in two hundred fifty gallons of cold water with 35 pounds sodium carbonate ($Na_2CO_3.10H_2O$). A cleansing treatment with a soap solution at 160 deg. Fahr. for forty minutes follows, and the goods are then washed well and acidulated.

In the above-described process direct dyes are mentioned as being suitable for use, and in this class may be used Pontamine Green BBX, Diazoline Dark Brown, Accordine Seal Brown, and others. This list is illustrative, not exhaustive, as other dyes may be used according to their nature and shade. The various colors listed may be produced on silk, particularly silk piece goods, by the use of various dyes and combinations of dyes, but for the sake of specific examples the colors listed may be produced by the use of the following dyes. Chestnut is obtained by using Accordine Seal Brown, Diazoline Dark Brown, Diazoline Dark Scarlet, and a little Chrysophenine G; Seal is obtained in the same way plus Pontamine Green BX; Navy 1 is obtained with Diazoline Sky Blue and

Diazoline Dark Scarlet; Navy 2, 3 and 4 in the same way as Navy 1 plus Pontamine Green BX; Brown is obtained with Diazoline Dark Brown, Chrysophenine G, Pontamine Green BX, and Diazoline Dark Scarlet; Tobacco, Negro and Olive Brown in substantially the same way as Brown.

As a result of the above process there are produced varieties of dyed silk piece goods which are washable, that is, they may be washed in water containing soap at a temperature of 110 deg. Fahr., and they will, in most cases, stand 180 deg. Fahr. without suffering unevenness in shade or color, or distinct loss of color. In addition to the highly desirable quality of being washable, these piece silks have also the property of being washable without imparting any substantial amount of their color to the washing liquid, such as water or soap solution.

FALL MEETING OF THE AMERICAN CHEMICAL SOCIETY

In answer to inquiries as to the nature of the accommodations for the members of the society who will attend the Ithaca meeting this fall, the Committee on Housing has issued the following information.

The Cornell University dormitories are to be available for members and guests, and it is highly probable that all the visitors can be cared for on the campus. This will add greatly to their convenience, for the center of the city of Ithaca is some little distance from the University, and, although there are two car lines running to the campus, considerable saving of time will be effected by having all those in attendance housed within a short radius of the meeting headquarters. The dormitories are all within one block of the car lines, so that transportation to and from the city and the railroad stations will be simplified. It is planned to reserve Prudence Risley Hall for councilors and their wives; Sage Dormitory will be used for women chemists, and members accompanied by their wives, while the new group of residential halls for men will care for most of the other members. Cascadilla Hall will also be available, and, if enrollment necessitates, some of the university cottages, each housing twenty or thirty, will be made use of.

The service in the dormitories will follow closely that of a hotel, including daily care of the rooms and change of bed linen, supply of towels, soap, and the other usual conveniences. The bathrooms, while not individual, are numerous, and are arranged to accommodate several persons occupying adjacent rooms. There are three types of rooms available: Suites, consisting of a study and two bedrooms, or one double bedroom; double rooms, containing two beds and single rooms with one bed. The rooms are all large, since they are designed for living quarters for students, and the dormitories are also provided with commodious recreation and social halls. Though it is not likely to be necessary, the Committee on Assignments reserves the right to convert single rooms to double rooms if the enrollment is greater than is anticipated. If the double rooms are fully utilized this is very improbable. Since friends attending the meeting will naturally prefer to share the same room or suite, they will be able to make their reservations jointly, while groups of members having a common interest may arrange to occupy the same unit of the dormitory if they send in reservations together, before August 1st. The above facilities should play a large part in the unofficial phases of the meeting, since the opportunities for visits and informal discussions will be manifold.

The rates established for all of the university dormitories are as follows: Single rooms, $2; double rooms, $1.50 per person; suites, $2 per person.

Assignments to rooms will be made in the order of their desirability, as the applications are received. It is suggested reservations be made as far in advance as possible, to facilitate the plans of the dormitory management. Letters requesting rooms should be addressed to F. R. Georgia, Baker Laboratory, Cornell University, Ithaca, N. Y., and should contain the following information:

Name (indicate sex); address; kind of room desired; whether councilor or not; if accompanied by wife, or by roommate; name and address of roommate; probable time room will be occupied and vacated.

All reservations will be confirmed and members will received cards assigning them to their dormitory and room, so that on arriving in Ithaca they may take the street car direct to the dormitory, present this card and go directly to their rooms. Charges will be collected at the registration headquarters in Baker Laboratory.

The two principal hotels of Ithaca, the Ithaca Hotel and the Clinton House, have announced rates ranging from $5 per day for one person with bath, to $2 per day for two in a room without bath. Reservations should be made by writing the hotel.

Meals will be served in the University dining rooms, attached to each dormitory, and these will be found more convenient to the meeting than the hotels or restaurants in the business part of Ithaca. Visitors may take their meals where they please, and need not patronize the dining room in their own dormitory. This will permit a great deal of "mixing around" at meal time. It is planned to serve the luncheons in the Drill Hall of the University, and thus to gather together all of the members once a day where they will have abundant opportunities of meeting each other, and of grouping at the tables according to their interests. This will, in a way, extend the plan of the group dinners to include all of the members, while at the same time providing more flexible and informal gatherings. The rates for meals served by the University are: Breakfast, 75 cents; luncheon, 75 cents; dinner, $1.25, and the charges will be collected at the time of service.

All the plans made by the general committee have been developed to the end that the meeting shall be more than a gathering of listeners to papers. The social side has

been carefully worked out, and as a reunion for chemists, the arrangements afforded by the university dormitories and dining halls will serve most admirably, and will permit the utmost in good fellowship and personal contact between members.

INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, 90 William Street, New York City.

B. C. L.—Question: I am using sodium peroxide in bleaching silk goods and often find them full of small holes about the size of a pin head. What would cause this?

Answer: You are probably familiar with the energetic nature of the sodium peroxide and have seen it cause a blaze when put on paper and sprinkled with water. It is quite possible that when you are making up your bleach liquor and sprinkling it into the acid some of the dust floats in the air, just as dyestuff dust will float and travel incredible distances. Every speck of the dry peroxide that alights on the damp goods will cause a strong caustic soda effect on one or more fibers, although too small to cause a fire. There should also be a yellow stain at this stage, although the bleaching later will remove it. To prevent recurrence of the trouble mix the peroxide in a separate room or outdoors.

L. M. & Co.—Question: Dyeing Chrome Black on loose wool has been giving a lot of trouble lately; laboratory tests show that the dye is of the right shade and fast to milling, but the regular work appears rusty in spots and bleeds badly. What could be the cause of the trouble?

Answer: Every Chrome Black requires a definite amount of chrome to change the shade and make it fast, but very few blacks will stand a large excess of chroming, especially in a sulphuric acid bath. Many dyers use a little sulphuric acid at the end to exhaust the bath, and then chrome the wool in the exhausted bath. On account of the acidity of the wool the strong chrome solution does not get a chance to diffuse itself throughout the whole lot, but is taken up by whatever part of the wool it strikes first. This results in a mixture of very much overchromed wool, which is of a rusty color, and unchromed wool which will not stand milling. The remedy is to omit the sulphuric acid and use only acetic, and then feed the chrome slowly and evenly.

A. E.—Question: I should like to learn the method of dyeing heavy duck canvas for auto sport tops, their preparation before they are ready for the jig. Should the cloth be boiled, soured and washed, or should it be half bleached? It comes from the loom with all sorts of substances on it.

Answer: We believe the best pre-dyeing treatment for this material is to give it two separate boil-outs in soda ash solution, using about 1 per cent of soda ash to the weight of the fabric in each bath. It is not desirable to bleach. Give the goods a thorough rinsing after the second boil-out, and before entering the jig. If the material is not too heavy this method ought to insure satisfactory penetration.

A Dyeing Problem

SCROOPING OF MERCERIZED COTTON

PROBLEM EDITOR: The writer was once called upon to introduce the scrooping of mercerized cotton yarn into a plant that had never done it, and since he, himself, had never before tried it, it proved to be something of a problem.

References to the printed instructions seemed to be of little use, as the directions either did not work under the plant conditions, or appeared entirely impractical.

By a little careful experimenting a method was found that gave good results. It is not claimed to be the only, or the best, or the cheapest method, or to work under all conditions, but it has proved to be a practical method to obtain a scroop of good permanence. It was worked out for odd lots of various tints and shades, and is necessarily a little expensive under these conditions, but readily adaptable to larger scale production from standing baths (where they can be used without different shades affecting one another) at reasonable cost.

The method is briefly described as applicable to a run of several lots of a single tint or light shade.

Dye the yarn from a soap bath using as much soap as possible (2 per cent or more), preferably without salt, and finish near the boil; when the shade is obtained transfer the yarn to the soap tub made up at 7 ounces per 10 gallons of good 88 per cent soap and start the scrooping hot, preferably at the boil, with a turn now and then, for one-half to one hour.

Lift into a tub of cold water and wash quickly, one or two turns only, then without whizzing, enter cold acetic acid at 14 ounces of 28 per cent to 10 gallons. Give about four turns during 20 minutes. Whiz and dry. In a particular truck dryer 1½ hours at 180 deg. Fahr. was found satisfactory.

For further lots it is only necessary to replace the soap and acid that have been actually removed, although the addition of a little excess is advisable. The proper amount can be estimated by noting the loss of liquor when raising the yarn. If it is two inches out of a total depth of 24 inches, add one-twelfth of the original amount of soap or acid, plus a moderate excess.

A few words will explain some of the points. It was found that dyeing directly in the strong soap bath caused the yarn to float and work so badly that it dyed very unevenly. The weaker bath works all right and can be used standing, or discarded without great loss of materials. Soap clears the yarn and brightens the shade, so the result from dyeing in a soap bath is often nearer the final shade, and less allowance need be made for the scrooping. If dyed in soap the yarn is in equilibrium with a soap bath and will strip or change less in the scrooping soap.

For a series of colors, the darker shades can follow the lighter, and so on according to the requirements and to the ordinary principles of dyeing.

The drying is important. The yarn should be spread rather thin, and evenly. Over drying, even too high a temperature for a few minutes, will deteriorate or destroy the scroop, while the proper effect is not obtained at all if the yarn is not dry enough.

For dark shades it will probably be better to dry in the soap bath as usual, and then add further soap, finishing at the full amount required for scrooping.

The ideas to be emphasized are soaping hot, which apparently gives the thorough penetration necessary to a permanent scroop, and the light rinse to take out the loose surplus soap. A process to satisfy almost any requirements can be built up around these principles.

G. F. C.

W. K. Robbins has resigned as superintendent of the dyeing department of the Amoskeag Manufacturing Company, and will now work exclusively as research chemist. His resignation comes on the forty-third anniversary of his joining the chemical staff.

New business in chemicals and dyestuffs in the Boston market remains very slow, but there is a better sentiment following the more cheerful news from the textile industry, noticeable among which is the report that certain mills in Lowell and Lawrence have issued orders that all vacations be completed by August 1. This is taken as indicative of a strong belief that demand for textiles is about to expand and is really the first encouraging news that the chemical and dyestuff people have received for some time.

R. H. Eagles, of J. M. Huber, Inc., New York, makers of Carbon Black, has just returned from a trip to the Pacific Coast. He says that business in the West appears to be more active than in the East.

Control of Devoe & Raynolds Comppany, one of the oldest paint manufacturing firms in the country, has passed to sixteen employees who have bought control from the old owners. Due to the new policy of advertising and the modern methods of advertising adopted by the younger generation, a statement by the company said, its sales have doubled in the past five years, at an annual increase of about 25 per cent.

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WANTED—A dyer to act as assistant foreman, who is experienced in skein silk dyeing; knowledge of vat dyes required. Address Box 259, American Dyestuff Reporter.

SILK PIECE GOODS DYER

WANTED—A dyer who is experienced in the dyeing of silk piece goods, including all silk, silk and wool and silk and cotton. Address Box 260, American Dyestuff Reporter.

CHEMIST AND DYER

Married man thirty-five years of age, thoroughly familiar with the application of vat, sulphur and direct colors on cotton warps and skeins, will be open for position July 15th. Can furnish highest references and has had several years' experience as overseer in a gingham mill. Address Box 262, American Dyestuff Reporter.

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WANTED.—Dyer, young man experienced in Laboratory work, testing colors for properties, also capable making up sample books. Address Box No. 265, American Dyestuff Reporter.

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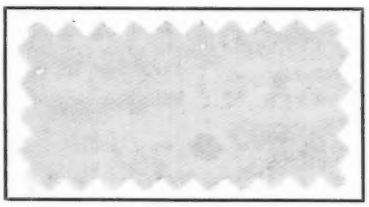

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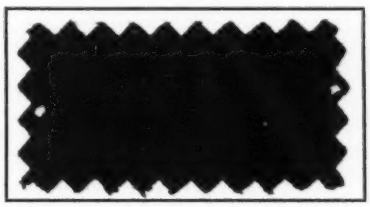
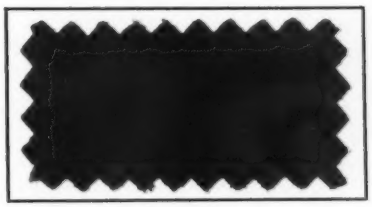
dyed with
10% Glauber's Salt Crystals
2% Sulfuric Acid

2% National Alizarine Sapphire SE
dyed with
10% Glauber's Salt Crystals
3% Sulfuric Acid





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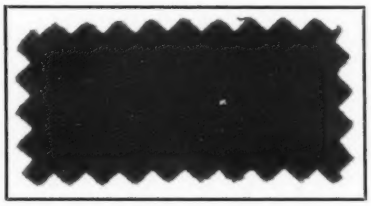

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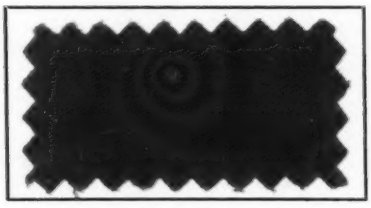

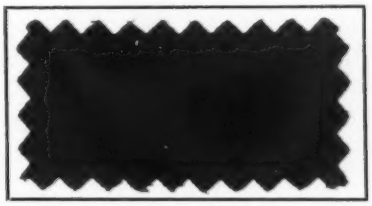

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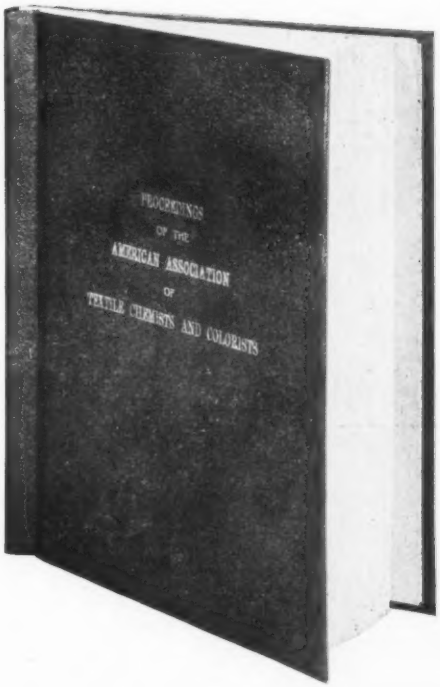

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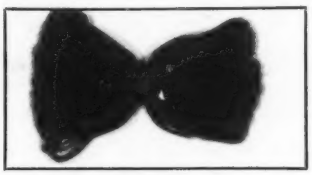

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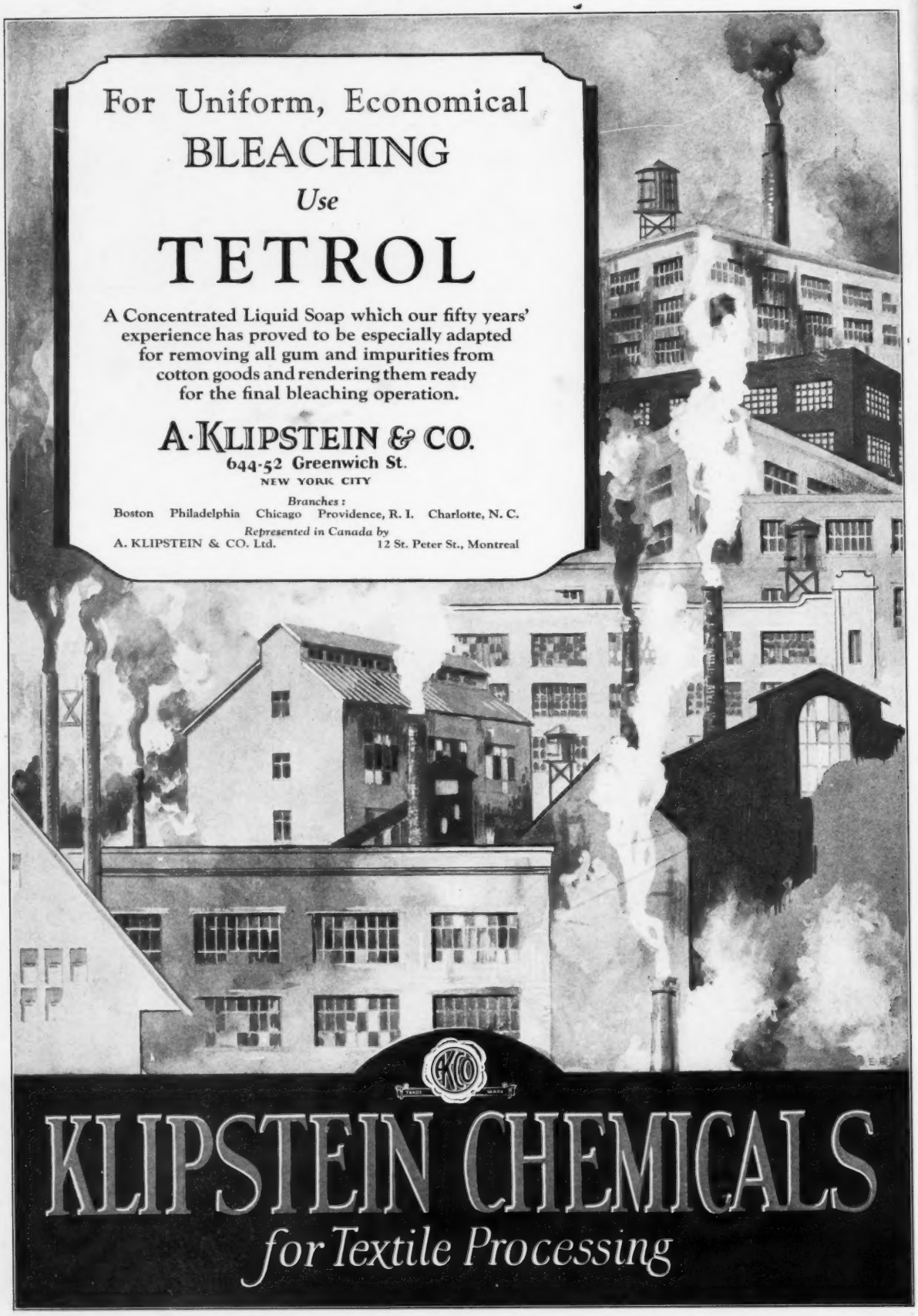

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